WATER WORKS & SEWERAGE

THE FILTRATION PLANT AND PUMPING STATION OF FORT DODGE, IOWA

Water can be either friend or foe. When it carries disease, water is a deadly foe. Chlorine makes it a friend.

Chlorine's protective armor against water-borne disease is defending our armed forces everywhere. In base hospitals Chlorine guards wounds against bacteria, in camp laundries it protects clothes, in foot baths it battles common fungus infections. And everywhere, Chlorine and its compounds are helping make drinking water safe.

It is to these purposes that the principal output of Penn Salt Chlorine Products are dedicated right now. As you can see, military demands must be answered first. But while this is happening a vast fund of experience and expanded facilities is being created. And this will be dedicated to the more effective service of our customers when peace returns again.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

Penn Salt manufactures
LIQUID CHLORINE
for water sanitation and sewerage treatment
also
Perchloron* • Anhydrous Ammonia
Filter Alum • Ferric Chloride
Sodium Aluminate • Chloride of Lime
Caustic Soda and other products
*Trade-mark Reg. U. S. Pat. Off.

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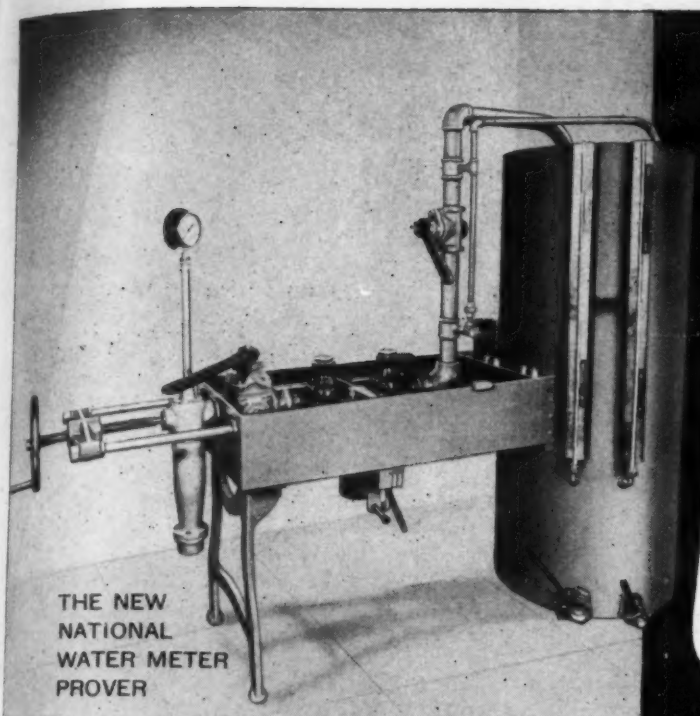


It's Good Business

AT ANY TIME TO GET THE MOST out of YOUR METERS

HERES A REAL PROVING PLANT!

A modern prover is a "must" for every meter repair shop.

The National Water Meter Prover sets a new high in accuracy and convenience. Designed to conform with the ideas of practical meter maintenance men, this prover provides accessibility, ease and speed heretofore unobtainable. It will test, by the volumetric method, meters up to and including the 2" size.

The cylindrical tank is divided into two compartments, one holding 100 U.S. gallons—the other 10 gallons. Each compartment carries a separate graduated scale, adjustable for calibration and marked to read directly in percentages of error at four points. Meters are quickly clamped in place by a handwheel and screw arrangement. A rate of flow indicator is provided calibrated to record flow rates of from 1/16 gpm up to 160 gpm. Write for bulletin.

Common sense dictates good meter care. Now especially, it is imperative to make old equipment last for the duration. Today's operations call for increasing vigilance on the part of those in charge of measurement. Inspect and test regularly, service carefully, and thus forestall as much as possible the need for new meters.

PITTSBURGH-NATIONAL Meters are easy to keep operating at top accuracy. They can be renewed and modernized through the installation of interchangeable parts that incorporate, wherever possible, the latest advances in construction.

The durable quality of PITTSBURGH-NATIONAL Meters is now proving its worth on important war-time assignments. Given proper care they can be depended upon to provide high measurement standards even after serving their normal life span.

PITTSBURGH EQUITABLE METER CO.

Atlanta Boston Brooklyn Buffalo Chicago Columbia Houston Kansas City Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

MERCO NORDSTROM VALVE CO.
Main Offices, PITTSBURGH, PA.

National Meter Division, Brooklyn, N. Y.

"Water Meters"

TELEPHONE
LEXINGTON 2-7600

Johns-Manville
TWENTY-TWO EAST FORTIETH STREET
NEW YORK, N.Y.

An open letter to the Municipal Executives of Everytown, U.S.A.

On battlefronts throughout the world, our boys are risking their lives to preserve our way of life. When they return, what will they find here at home? A better America? An immediate job? That is what everybody hopes.

Helping to provide that is the desire as well as the responsibility of every mayor, every city manager, every councilman, every operator of municipal services, and every citizen of America.

One way we can provide our boys with immediate jobs...and at the same time benefit our cities, towns, and villages...is to improve and expand our water and sewage systems.

Such a program would be of particular value because it could be started immediately when wartime restrictions are lifted, providing returned soldiers and war workers with jobs during the period that industry will require to reconvert from war to peace production.

But if this program is to be effective, planning must be started now.

Time may be shorter than we think. By starting now, confusion can be avoided. Planning can be constructive, efficient. Local needs can be analyzed. Working plans prepared. Specifications and contract documents drawn up. Enabling legislation enacted. Financing arranged. Rights of way purchased. Everything put in order, ready to go when the boys come home again.

As an aid to municipalities in planning permanent public improvements of benefit to every member of the community, the Committee on Water and Sewage Works Development has prepared a booklet entitled "Blueprint Now." In case you have not received a copy, we are sure they will be glad to send you one. The Committee may be addressed at Suite 2110, 500 Fifth Avenue, New York 18, New York.

Johns-Manville

This booklet can help you

IN WAR OR PEACE

...you can always rely on the dependable uniformity and purity of

DIAMOND LIQUID CHLORINE

Year in and year out, DIAMOND LIQUID CHLORINE provides the dependable uniformity and purity you need for the satisfactory operation of your plant. Delivered to you in tank cars, individual cylinders or multi-unit cars, whichever best suits your needs, DIAMOND LIQUID CHLORINE helps safeguard water treatment.

ALKALI

DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

YOUR WATER LINES CAN BE NO MORE EFFICIENT THAN THEIR JOINTING!

This Chain of Obvious Advantages shows why

Tegul-MINERALEAD

SHOULD PROVE YOUR BEST INVESTMENT IN JOINTING COMPOUND

10 lb. INGOT FORM
Easy to ship, store, handle and work.

CANNOT CHANGE PHYSICAL CONDITION

UNAFFECTED BY STORM OR FLOOD. Can be stored in the open unprotected

JOINTS SHOW MUCH LESS INITIAL LEAKAGE

BACKFILLING CAN BE STARTED IMMEDIATELY

JOINTS HAVE HIGHER RESISTANCE TO THERMAL AND MECHANICAL SHOCK

ONLY PRACTICAL COMPOUND FOR LINES CARRYING HOT WATER

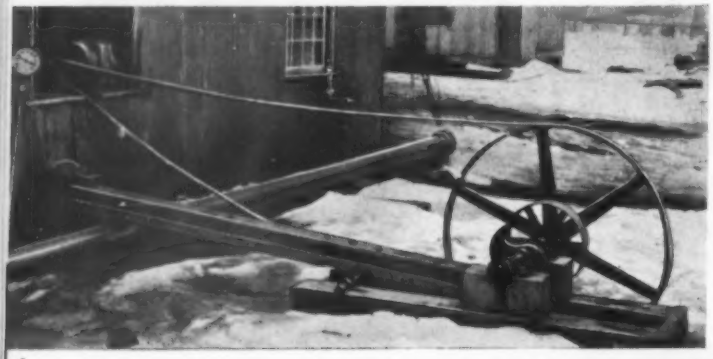
AVAILABLE—STOCKED IN MAJOR CITIES and in HAWAII

NOT A STRATEGIC WAR METAL

All this adds up to SOUND ECONOMY

- **Check them against any other jointing agent you may have in mind for that next Bell & Spigot Line job.**
- **Years of trouble-free service from lines laid in**

Every sort of terrain . . . and at sub zero to top summer temperatures . . . meeting almost continuous vibration and heavy mechanical shock **promise that *Tegul*-MINERALEAD will serve you equally well under any conditions you may have to meet.**



THE POWER HAMMER TEST

is, we believe, the most convincing demonstration of durable jointing on record. It's a story of compelling interest to everyone who have to do with water line specifications and laying. Write for your copy NOW! Address our head office at Mertztown, Pa.

At the nearest address listed below is an ATLAS representative who can show you how to save time, trouble and money in laying your Bell & Spigot Water lines . . .

THE ATLAS MINERAL PRODUCTS COMPANY

of MERTZTOWN Penna. PENNSYLVANIA

*ATLANTA 3, Ga., 610 Red Rock Bldg.
*CHICAGO 1, Ill., 333 No. Michigan Ave.
*DALLAS 5, Tex., 3921 Purdue St.
*DETROIT 2, Mich., 2970 W. Grand Blvd.
*JACKSONVILLE 5, Fla., 1463 Talbot Ave.
*KANSAS CITY 2, Kan., 1913 Touromee Ave.
NEW YORK 16, N. Y., 280 Madison Ave.
PITTSBURGH 10, Pa., 4656 Old Boston Rd.
TORONTO, Ont., McRae Engineering Equipment, Ltd. 11 King St., West

THE ATLAS MINERAL PRODUCTS COMPANY of California
REDWOOD CITY, California
*DENVER 2, Col., 1921 Blake St.
*HONOLULU 2, Hawaii, U. S. A.
SALT LAKE CITY 11, Utah, 1212 So. State St.
*LOS ANGELES 12, Cal., 817 Yale St.
*SEATTLE 14, Wash., H. D. Fowler Company, P. O. Box 3084

*Stocks carried at these points

An INSIDE View of the DRESSER BELLMASTER

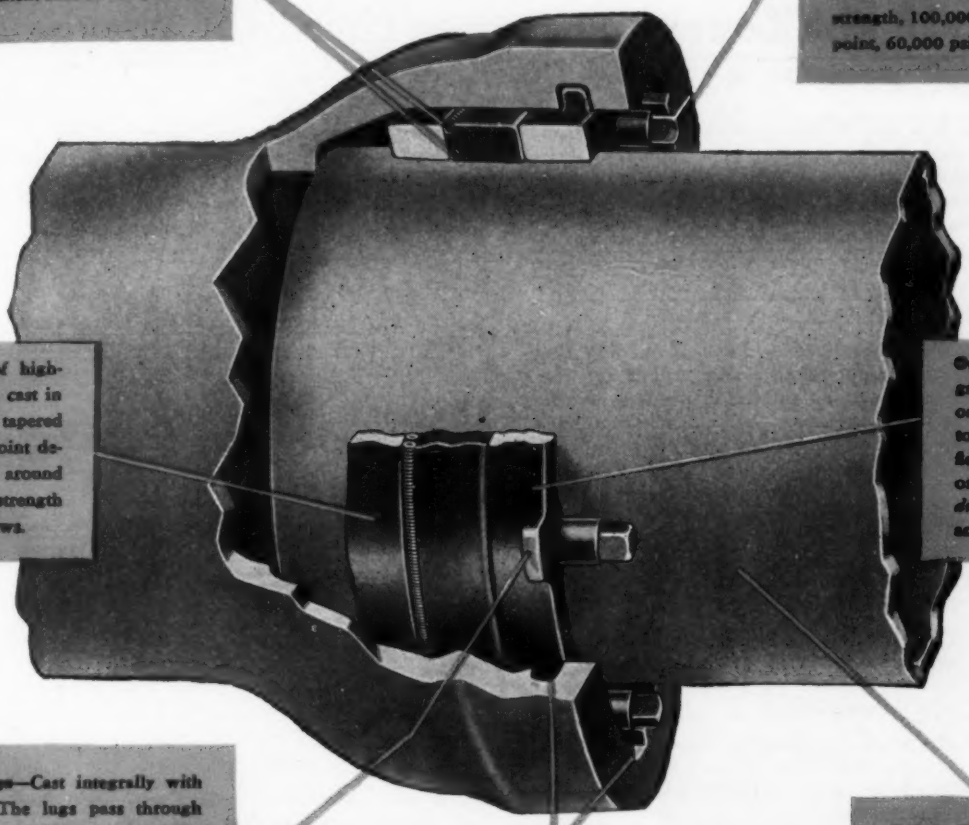
The Tight CIP Joint that Fits Inside the Bell

Gaskets—Plain or Armored type gaskets are available, depending on line contents. When ordering, specify service. Gaskets are ¾″ x 1 1/16″ in cross-section and are of scientifically prepared, resilient rubber compound.

CUTAWAY VIEW

Style 85—Dresser Bellmaster Joint

Capscrews—Cold-upset from special steel and heat-treated for maximum strength. Double-headed: square section for wrenching, and large round section for extra protection against corrosion. Minimum ultimate tensile strength, 100,000 psi. Minimum yield point, 60,000 psi.



Inner Ring—Made of high-grade malleable iron, cast in one piece. Outside is tapered to permit maximum joint deflection. Extra metal around *tapped* screw holes for strength and protection of screws.

Outer Ring—Made of high-grade malleable iron, cast in one piece. Tapered on outside to permit maximum joint deflection without metal bending or stressing. Extra metal around *drilled* screw holes for strength and protection of screws.

Locking Lugs—Cast integrally with outer ring. The lugs pass through "slots" in the bell face when the Joint is inserted. The Joint is then turned clockwise until one lug hits the stop in bell groove, preventing rotation of joint while capscrews are tightened.

Bell End of Pipe—Inner circumference is grooved to accommodate locking lugs. Slots on face of bell permit lug passage. When ordering, simply specify "Bellmaster Pipe."

Spigot End of Pipe—Absolutely plain. No bead, lip, or other special shape required.

Shipped, Stored, Installed All In One Piece

The Dresser Bellmaster Joint, Style 85, makes cast-iron pipe joining faster and easier than ever before. Light, compact, all-in-one-piece, this mechanical joint is locked into place and tightened—in from 2 to 5 minutes' time.

Compression of the resilient rubber-type gasket between two metal rings and against the pipe by cap screws, effects a flexible seal that stays tight even under severe conditions of expansion, contraction, deflection and vibration. Your cast-iron lines are thus protected from breakage and leakage. They may be laid above the ditch and safely lowered in place.

The Bellmaster fits *inside* the bell. It is completely enclosed—no exposed parts to chip, break or corrode. Bellmaster pipe can be readily obtained from your regular source of supply. And we are able to ship joints promptly. Sizes 3″, 4″, 6″, 8″ 10″, 12″, 16″ CIP. *Catalog 395 AM on reque*

In Canada: Dresser Manufacturing Co., Ltd., 60 Front St., West, Toronto, Ont.

DRESSER MANUFACTURING COMPANY • BRADFORD, PA.

How to Get the Best Possible Coagulation

With the Lowest Possible Chemical Dosage

Here is a fact of vital importance to any plant operator facing a water or sewage treatment problem of the types best solved with a ferric sulfate coagulant:

> Years of experience have proved that the efficiency of any ferric sulfate coagulant is in direct proportion to the coagulant's ferric sulfate content.

Since the minimum ferric sulfate content of Ferrisul is 90%, substantially higher than that of any other commercial ferric sulfate, this means that you can get the best possible coagulation with substantially smaller doses of Ferrisul than of any other commercial ferric sulfate.

For example:

> At one water plant treating for manganese removal, jar tests indicated that 25 p.p.m. of Ferrisul accomplished the same results as 32 p.p.m. of a 70% ferric sulfate;
>
> Tests at another plant treating for color removal showed that 18 p.p.m. of Ferrisul equalled the results attained by 22 p.p.m. of a 70% ferric sulfate;
>
> At still another plant, jar tests indicated that 24 p.p.m. of Ferrisul reduced color from 40 to 7 while 28 p.p.m. of the 70% material reduced color from 40 to 8.

Of course, to get the full value of Ferrisul's higher ferric sulfate content, you will want to determine exactly how much you need for the best results and you will then want to hold your dosage to this level, since any further increase will not materially improve coagulation.

For example, in the cases cited above, you would see little difference in results if Ferrisul doses were increased to the same level required with the coagulant of lower ferric sulfate content. Ferrisul's superiority is revealed by the fact that it takes *less* to produce the *same* degree of coagulation.

Other advantages which you get only in Ferrisul include these:

> Ferrisul is an anhydrous product, which means that it is free flowing, easier to handle and store and that it will not cake in storage;
>
> Ferrisul has a higher heat of hydration (260 B.T.U. per lb.), thus increasing the speed and efficiency of solution in water of any temperature;
>
> Ferrisul has a lower insoluble content, and what little insoluble you may find in Ferrisul is so fine that it flows out of the mixing pot with the ferric sulfate solution and does not collect in the pot where it would abrade mixer blades and the pot lining;
>
> Ferrisul is made in a modern chemical plant under closely controlled conditions, which means that you can count on uniformity from shipment to shipment.

Those are all important facts to remember when you specify a ferric sulfate coagulant. In many cases they are far more important in determining the actual cost of the water or sewage treated than the price you may pay per ton for the coagulant you use.

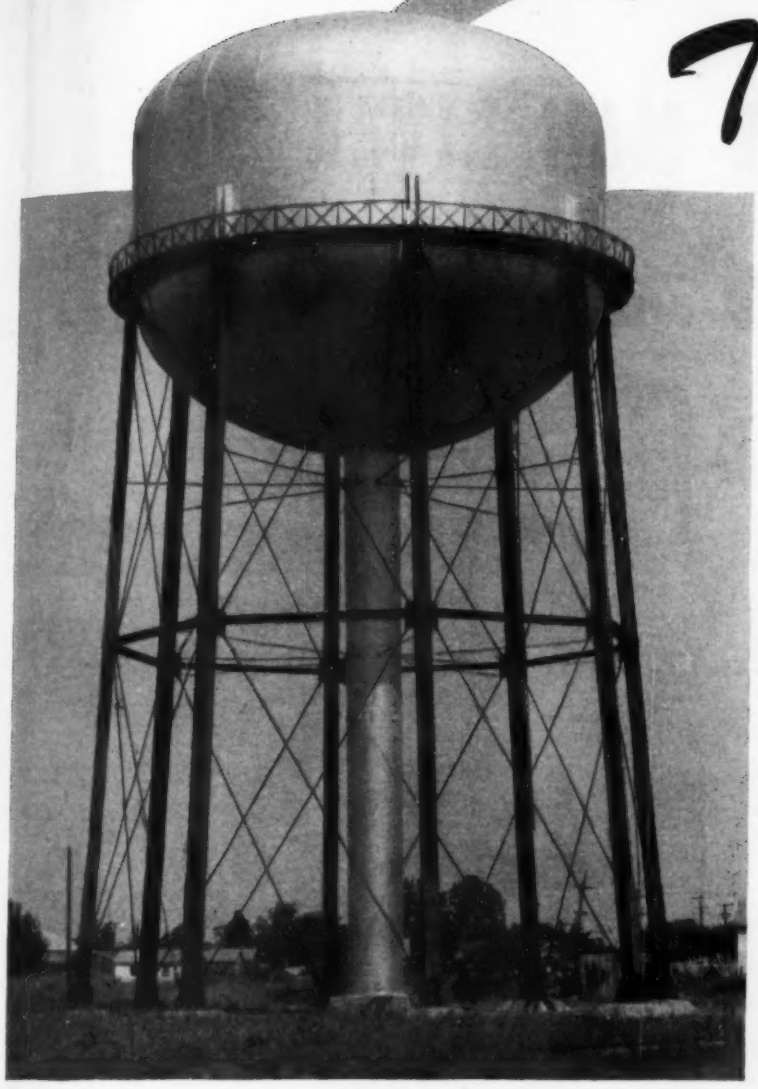
For more details and samples of Ferrisul and for experienced technical advice, write: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Massachusetts.

FERRISUL IS USEFUL

in water treating
for manganese removal
for clarification of turbid hard water which has been softened
for unsoftened turbid water of high permanent hardness
for clarification of soft water of low color and high alkalinity
for removal of color in waters of high or low alkalinities

in sewage treatment
for the reduction of odor
for the reduction of solids content
for meeting wide variations in pH
for handling overloads
for handling many special types of industrial waste

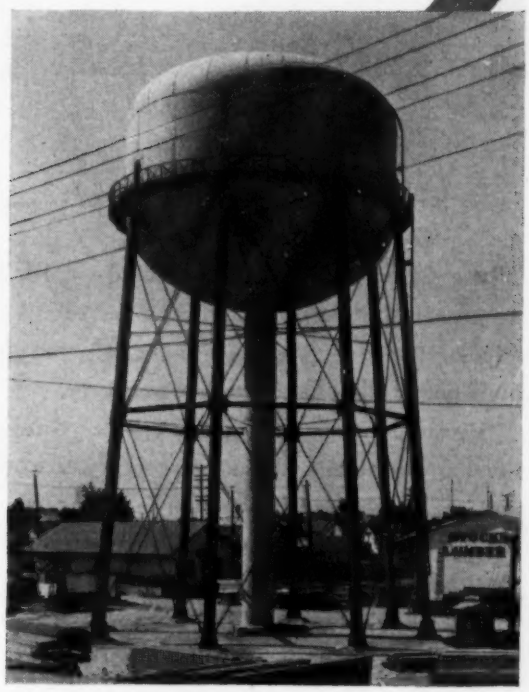
MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND



Two New HORTON ELEVATED TANKS

. . . for Stockton, California

The two Horton ellipsoidal-bottom tanks shown here have a capacity of 500,000 gals. each and are 60 ft. 7 in. to bottom. They are a part of the water system of Stockton, California.



TO smooth out variations in pressure and to meet severe hourly peaks which occurred during warm summer evenings, the California Water Service Company recently erected the two 500,000-gal. Horton elevated tanks, shown above, in the waterworks distribution system serving Stockton. These units supplement two existing tanks, one of 200,000 gals. and one of 500,000 gals. In addition to the 1,700,000 gals. in elevated storage, Stockton has 1,900,000 gals. of storage in a reservoir.

The distribution system consists of 188 miles of 2 in. to 14 in. diam. mains, and supplies the entire city, serving more than 15,000 residential and industrial users.

Elevated storage not only assures more uniform distribution pressures but also provides other advantages such as: a lowering of pumping costs, greater protection against fire hazard and a provision for pumping during off-peak periods. When planning postwar water supply system consider the advantages offered by Horton elevated storage. Write today for details.

CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Havana.....402 Edificio Abreu
Birmingham 1.....1586 North 50th Street
Plants in Birmingham, Chicago and Greenville, Pennsylvania

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Drive
Philadelphia 3.....1644-1700 Walnut Bldg.
Washington 5.....330 Bowen Bldg.
San Francisco 5.....1083 Rialto Bldg.
In Canada: Horton Steel Works, Limited., Fort Erie, Ont.

NOW OLD MAN RIVER

Can't "dilute" the War Effort

When Calco-Hardesty Gates stand guard, war production continues at full strength. These tried-and-proved gates eliminate the danger of high water flooding valuable property.

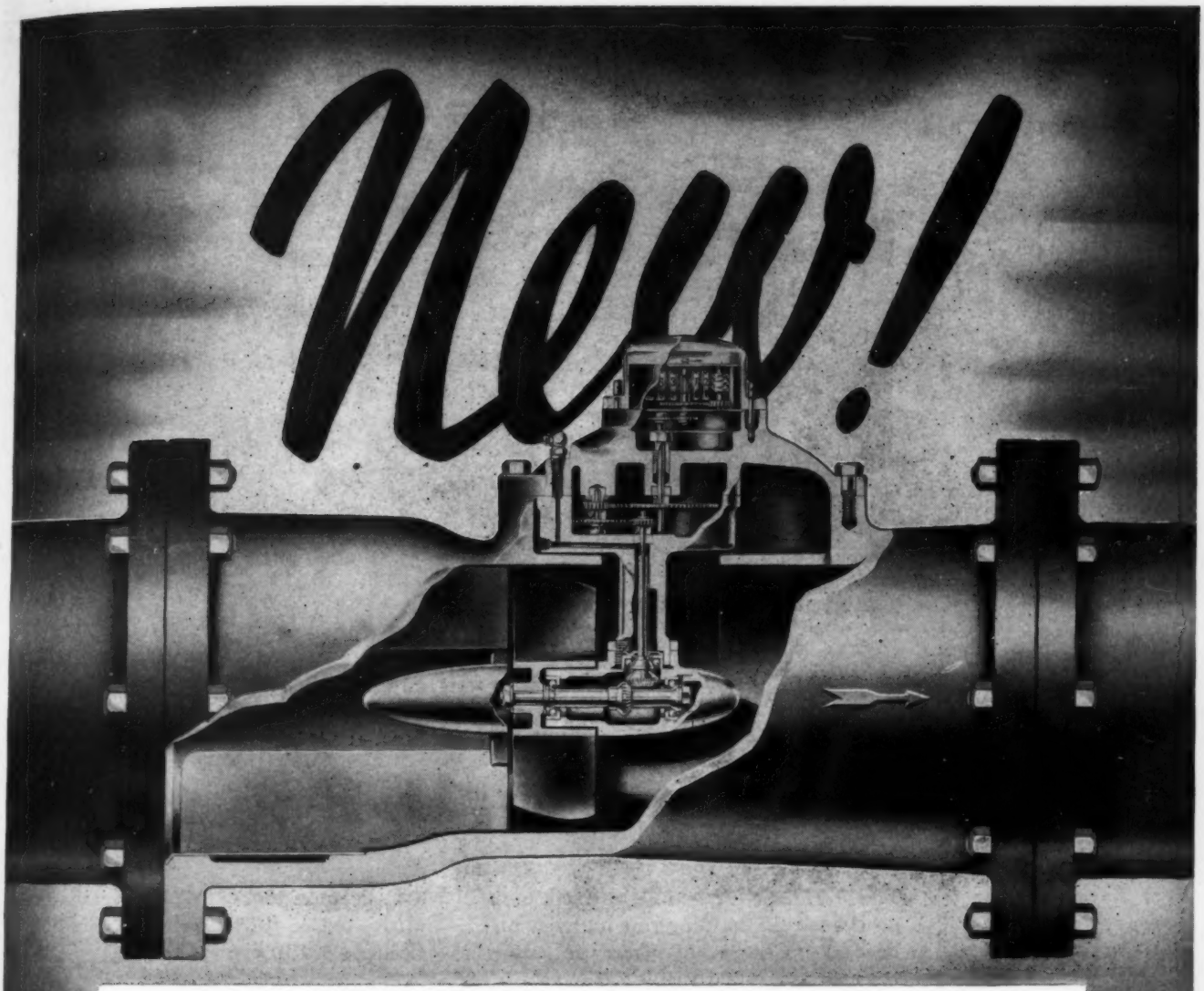
In war as in peace Calco-Hardesty Gates are ideal for drainage, flood control, sewer outfalls and wherever else backwater is a hazard. Unskilled labor can easily install them on any type of drainage construction. Then they are ready to say "NO" firmly when backflow threatens. Under normal conditions outflow is free and easy.

There is a size and type of gate to meet every requirement. These include automatic drainage gates that open and close without power or supervision; light- and heavy-duty slide gates; and automatic radial gates to keep water levels constant.

If you cannot get Calco-Hardesty Gates now for other than the most important war projects, remember them for the future. When the war is over they will be ready again to help protect valuable civilian property. Meanwhile write us for specific information. Armco Drainage Products Association, 315 Curtis St., Middletown, O.

ARMCO

CALCO-HARDESTY GATES



IMPROVED TOTALIZING PROPELLER TYPE FLOW METER WITH STREAMLINE VENTURI DESIGN

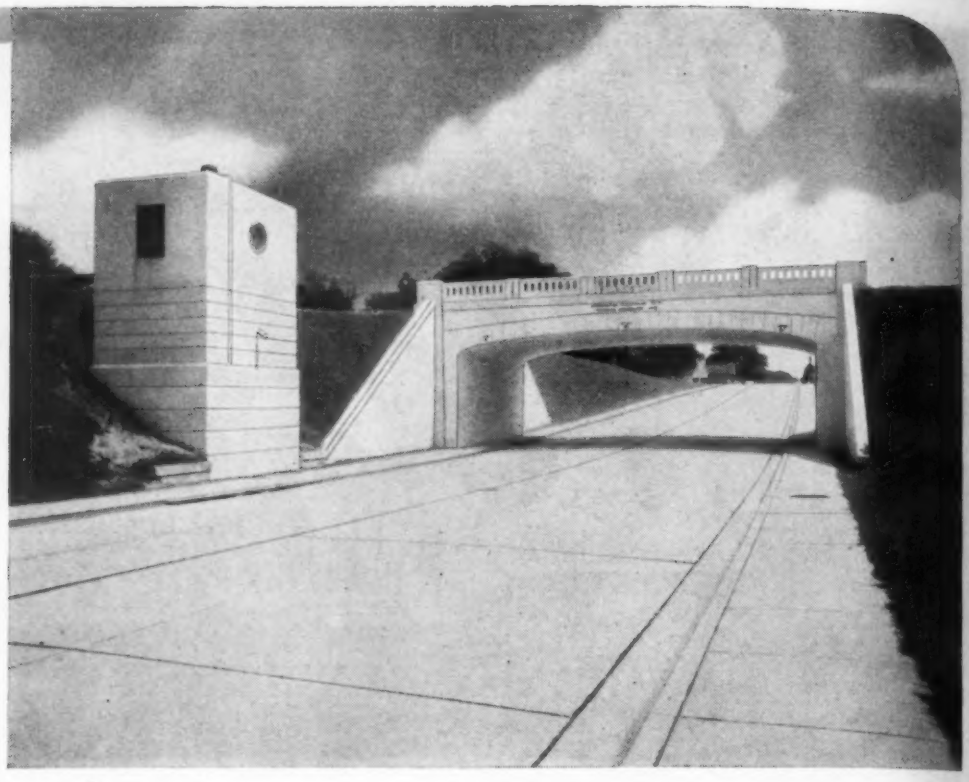
BUILDERS Propeloflo

A low price accurate meter incorporating BUILDERS traditional excellence of design and workmanship. For complete information, address Builders-Providence, Inc., (Division of Builders Iron Foundry), 9 Codding Street, Providence 1, R. I.

"BLUE PRINT NOW"

Sincerely Yours,

BUILDERS-PROVIDENCE



Tax Money Well-Spent!

The Florida State Road Department took no chances in building this highway underpass at Cottondale, where the terrain is as flat as a billiard table.

They knew in advance that there must be efficient and reliable provision for pumping out water as rapidly as it gathered from heavy rainfall.

Fairbanks-Morse engineers were called in on the problem and solved it. The result is two 8-inch Fairbanks-Morse Vertical Centrifugal Pumps, driven at 900 r.p.m. by Fairbanks-Morse 20-hp. Vertical Ball Bearing Motors.

The entire system is turned on and off automatically.

If your municipality has pumping problems now, or if you are planning for the future, why not consult with Fairbanks-Morse engineers? Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

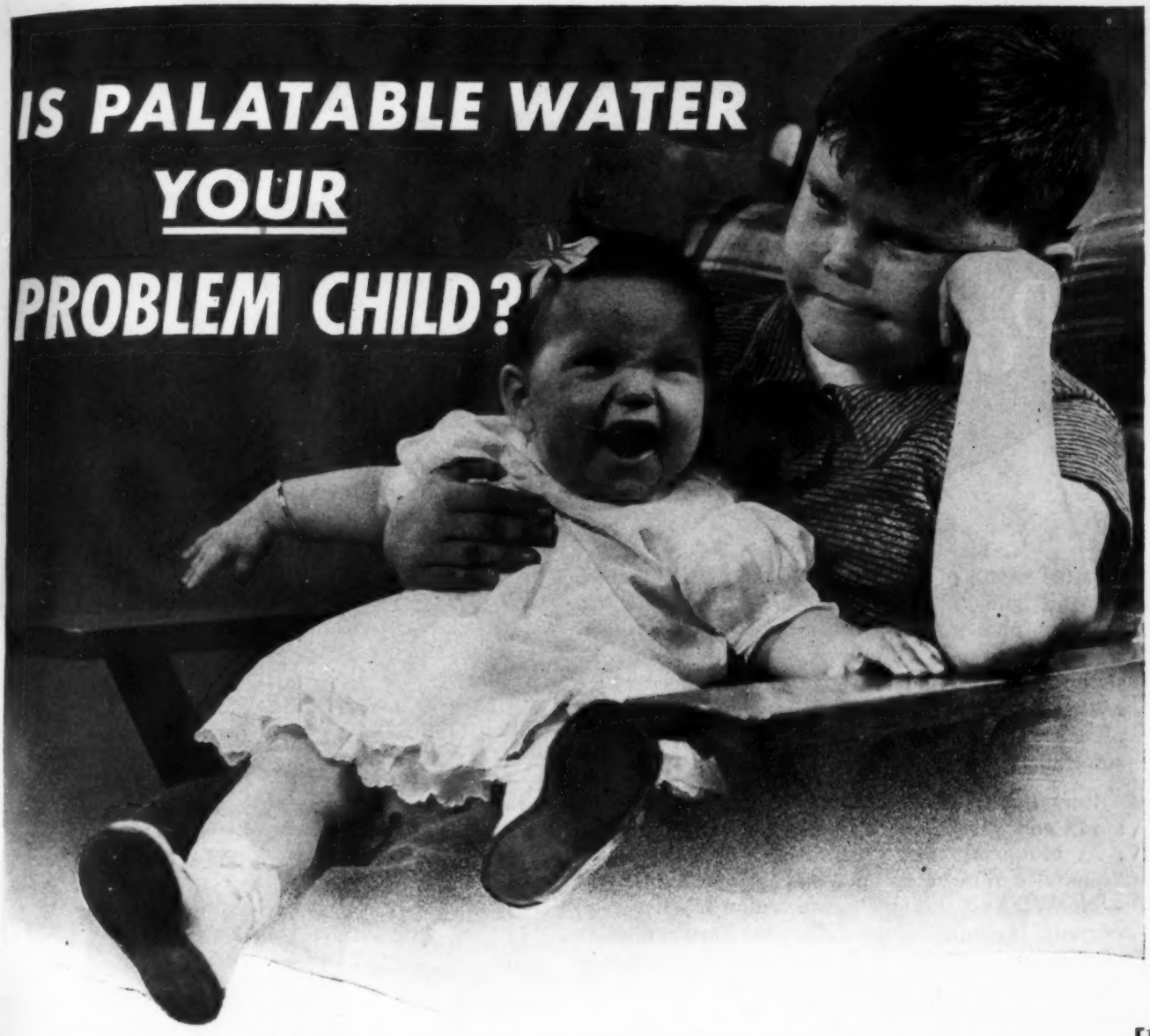
Here are the two 8-inch Fairbanks-Morse Vertical Centrifugal Pumping Units that keep the Cottondale underpass free from water during the heaviest rainfalls. Unit at right also connects to auxiliary gasoline engine that assures pumping during power failure emergency.

BUY
MORE BONDS

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Pumps



When tastes and odors in your raw water supply become a problem, it can be solved by the application of Aqua Nuchar Activated Carbon.

Aqua Nuchar will do a quicker, better job of water purification because it is specially manufactured for this one purpose. It should be remembered that when purchasing activated carbon you are not just buying so many pounds of material but, instead, you are buying the ability of the activated carbon to perform the work of removing tastes and odors. Activated carbons all have the same appearance but they vary in their power of adsorption and dispersion.

If you want to be sure of peak efficiency in your plant, specify Aqua Nuchar on your orders; it is the recognized standard quality activated carbon for removal of tastes and odors from water.

BLUEPRINT NOW!

But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. | 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS | 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. | 844 LEADER BLDG., CLEVELAND 14, OHIO

Knee-Deep in Postwar Plans?

THOUSANDS of city engineers, municipal officials, and consulting engineers are "knee-deep" in postwar plans. Many of these projects demand water conditioning equipment . . . new units to supply additional capacity or to replace those which are gradually becoming obsolete, and even complete new systems for clarification, filtration, or softening water supplies.

Fortunately, priorities place no restrictions on study and analysis . . . engineering and designing . . . blueprints and estimates. These important "musts" can be acted upon—decisions can be made —NOW! And this pre-peace action is vitally important. It can mean the difference between quick service and months of delay in the completion of the project you wish to carry through immediately after the war.

Graver engineers—specialists in the design and manufacture of water conditioning equipment—are immediately available to assist you in preliminary planning. They are ready to study your problem, recommend the necessary equipment, and submit complete designs and cost estimates.

Let's be realistic—*you* want your project completed—*we* want to help. We're ready to go the limit in rendering all possible assistance—and without obligation on your part. *Can we get together?*

GRAVER

WATER CONDITIONING EQUIPMENT

Process Equipment Division
of

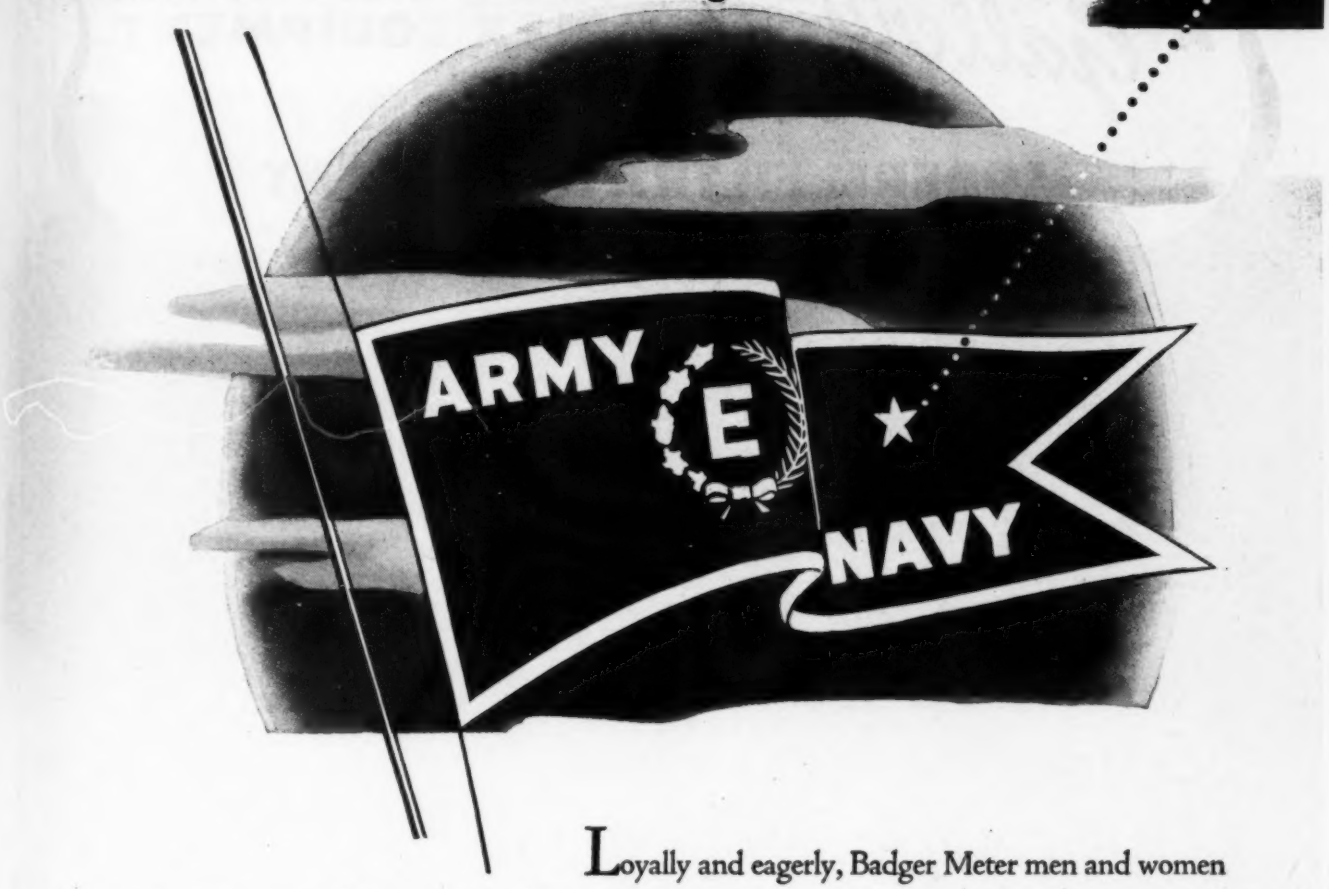
GRAVER TANK & MFG. CO., INC.

4809-43 Tod Ave., East Chicago, Ind.

NEW YORK CATASAUQUA, PA. CHICAGO TULSA

Graver designs, builds, and installs all types of water conditioning equipment including: Hot Process Water Softeners—Zeolite Water Softeners—Water Filters—Iron Removal Filters—Taste and Odor Removal Filters—Reactivators—Swimming Pool Equipment.

For *Continued* Outstanding Achievement



Loyally and eagerly, Badger Meter men and women continue to serve for victory, backing the attack by outstanding production of materials needed for war—keeping faith with their co-workers who are now in the Armed Forces.

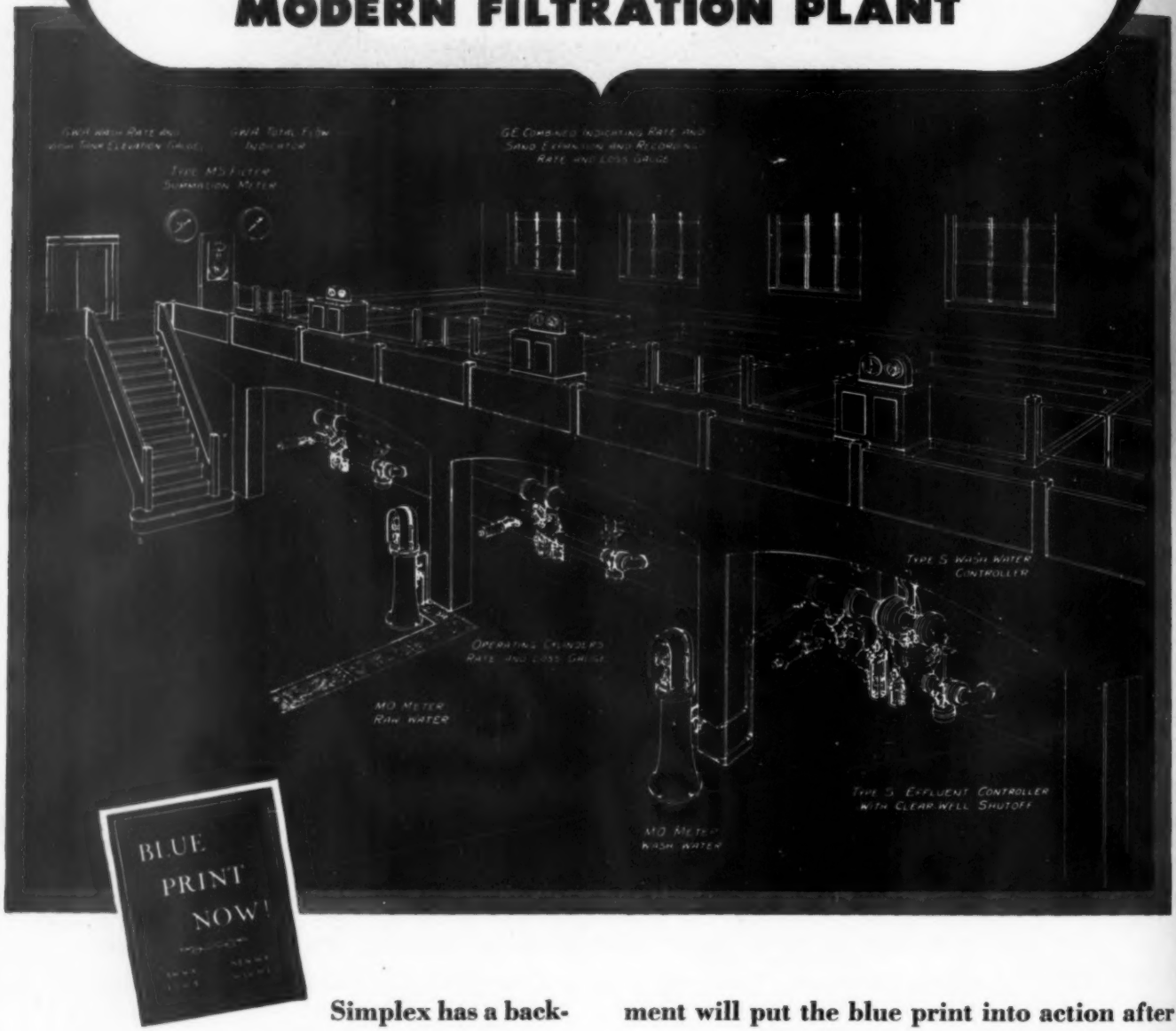
With understandable pride, Badger Meter folks point to the first star in their coveted Army-Navy "E" pennant that has flown over the Badger Meter plant since June 18, 1943—tribute to their continued outstanding achievement in war production.

The durability built into Badger Meters and the easy interchange of parts enable water works men to maintain Badger accuracy at commendably low cost, despite war-time restrictions on critical metals. In your postwar planning, put Badger Meters first.

BADGER METER MANUFACTURING COMPANY
MILWAUKEE • WISCONSIN

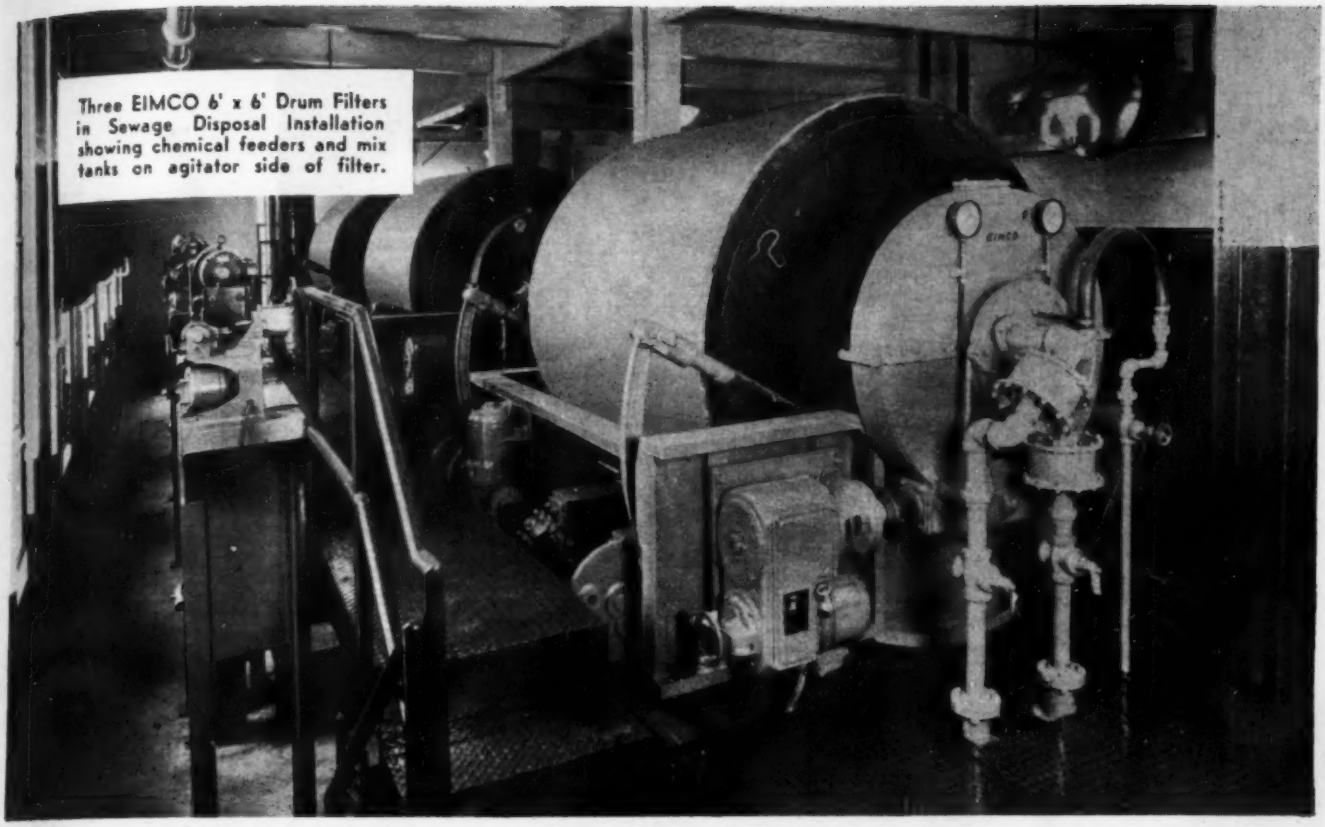
Branch Offices: New York City, Tampa, Fla., Seattle, Wash., Savannah, Ga., Kansas City, Mo., Marshalltown, Iowa, Waco, Texas, Los Angeles, Calif., Chicago, Ill., Philadelphia, Pa.

A "Gallery" of SIMPLEX EQUIPMENT for the MODERN FILTRATION PLANT


Type M3 Filter Submarine Meter
GE Combined Indicating Rate and Sand Expansion and Recording Rate and Loss Gauge
Type S Wash Water Controller
Operating Cylinders
MO Meter Raw Water
Type S Effluent Controller with Clear Well Shutoff
MO Meter Wash Water
BLUE PRINT NOW!

Simplex has a background of experience in the modernization of water treatment and sewage plants which is well recognized. Our specialized knowledge may well be of value to you in the pre-blue print stage just as Simplex equipment will put the blue print into action after installation. We would be pleased to talk over with you your plans for improving the efficiency of your plant now or in the future.

SIMPLEX VALVE & METER COMPANY
6743 UPLAND STREET, PHILADELPHIA 42, PA.



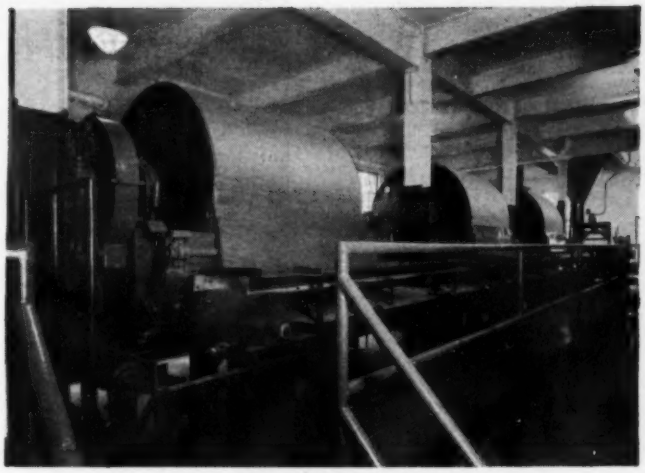
Three EIMCO 6' x 6' Drum Filters in Sewage Disposal Installation showing chemical feeders and mix tanks on agitator side of filter.

Eimco-Planning means proper installations for sewage disposal plants

What are the local conditions? How much floor space is available? How should equipment be arranged for maximum efficiency and minimum upkeep? How about future expansion? What about initial cost and how does it effect municipal appropriations? Competent Eimco engineers find the answer to all these questions before plans, specifications and bids are submitted for the installation of Sewage Disposal Plants.

The utmost care is taken in the construction of Eimco Continuous Filters and accessories, such as conveyors, sludge conditioning equipment, vacuum systems, elevators and mix tanks to fit the specific needs of each job. Planned installations are the foundation of Eimco's leadership in the sewage field.

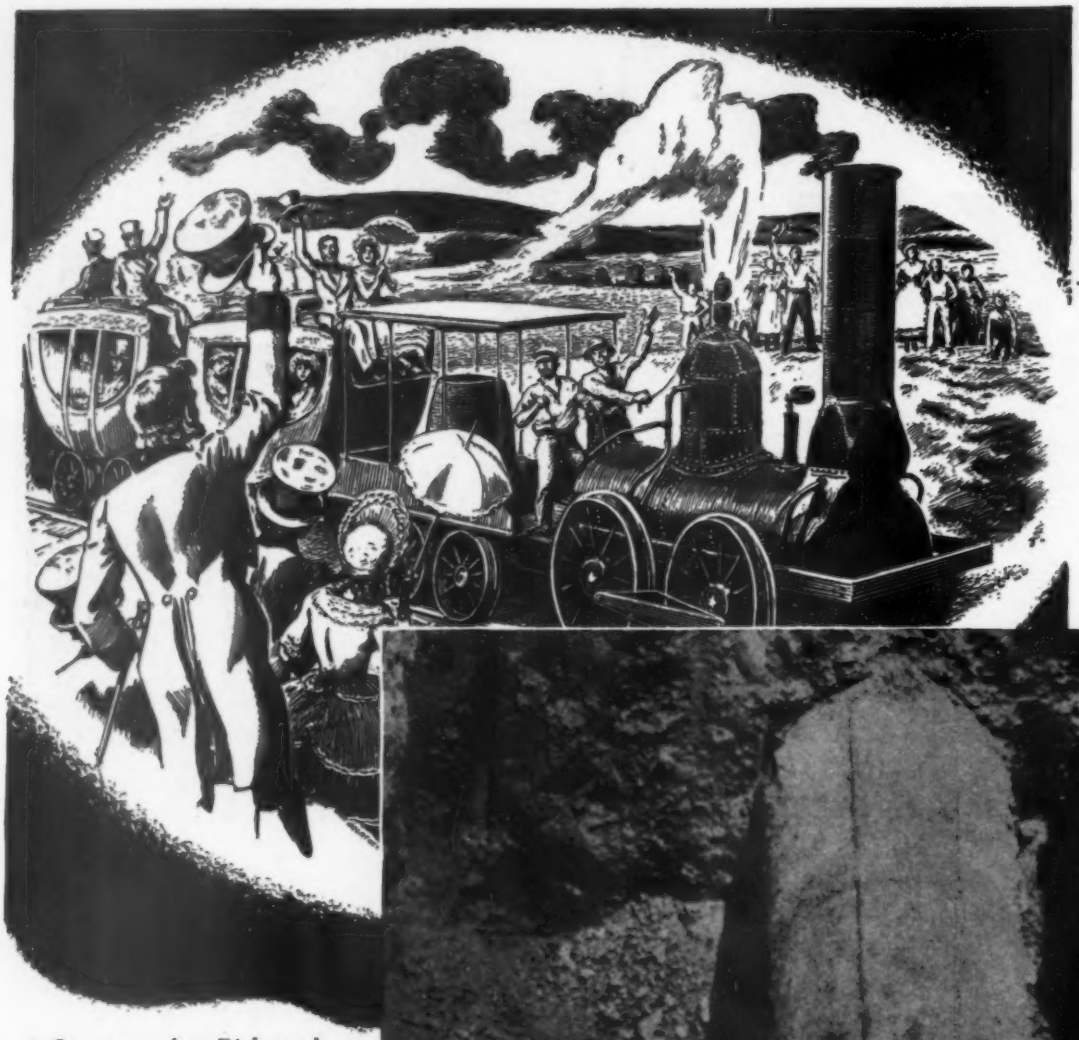
Write today for information about Eimco's specialized CUSTOM BUILT filter installations. A 55



Same installation of EIMCO Continuous-Vacuum Filters showing scrapers and conveyor.

EIMCO

THE EIMCO CORPORATION SALT LAKE CITY 8 UTAH
NEW YORK, 120 BROADWAY SACRAMENTO, 1217 7TH ST
CHICAGO, 111 W WASHINGTON ST EL PASO, MILLS BUILDING



Laid

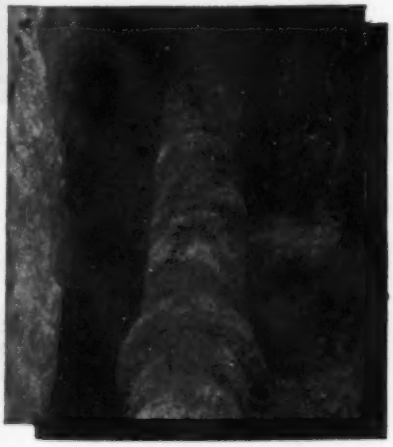
One year after Richmond laid this cast iron water main, the Hudson and Mohawk Railroad, America's first, was opened from Albany to Schenectady.

114 YEARS OF CONTINUOUS SERVICE IN RICHMOND, VA.

CAST IRON PIPE

before America's first railroad—*and still serving*

Mobile, Ala., 103-year-old cast iron water main still in service.



Lancaster, Pa., 105-year-old cast iron water main still in service.

IN a time of rumor of post-war substitutes for familiar and standard materials, it is well that the pipe buyer remind himself that cast iron pipe is the *only* material for underground mains with a *known* record of centuries of service.

The photograph of a cast iron water main, shown on the page opposite, was taken during an inspection twenty years after it had served 88 years in its original location and had been relaid elsewhere. It is today in its 115th year of consecutive service in the water distribution system of Richmond, Va. In Europe, cast iron mains are still in use after more than two centuries of continuous service.

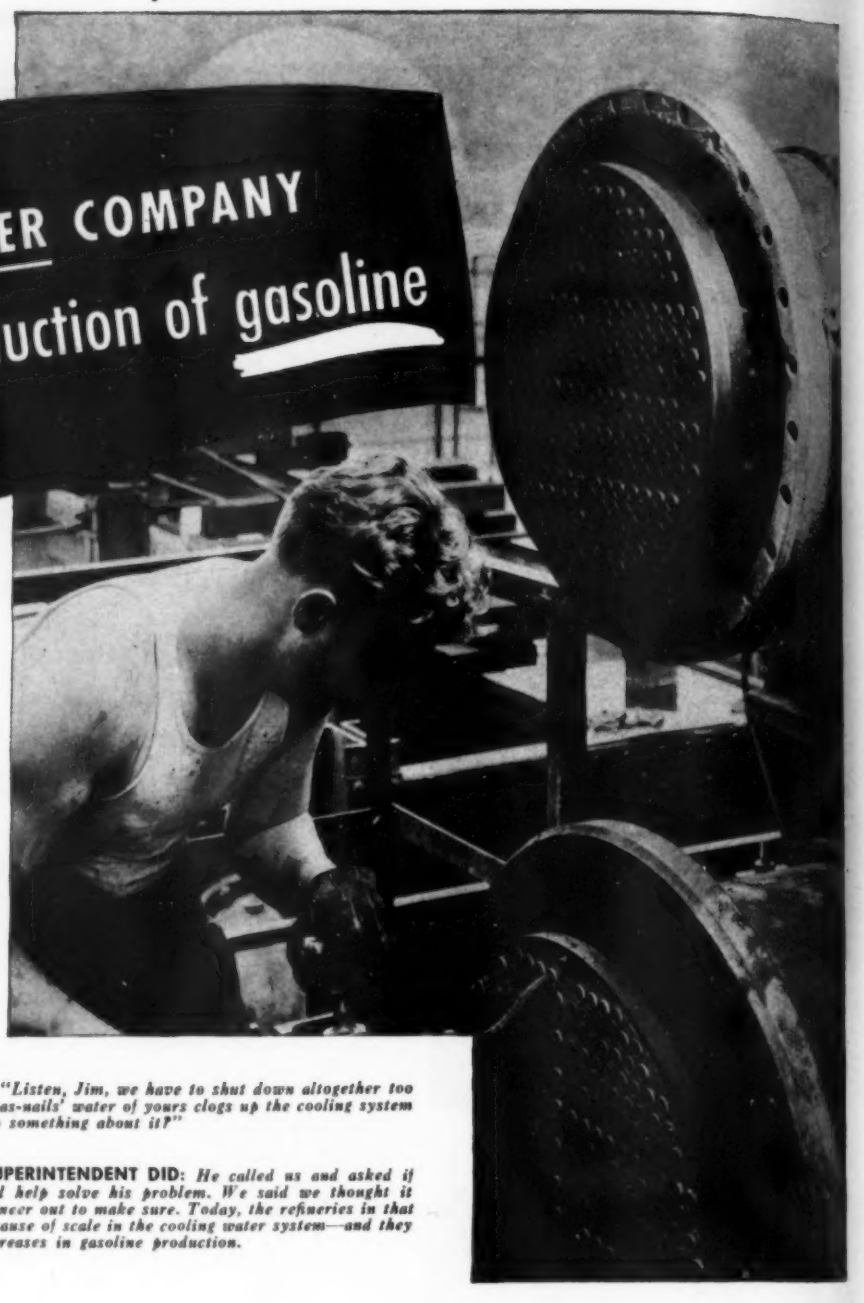
The judgment of a water works or sewerage works engineer who specifies cast iron pipe is vindicated in his own time by untroubled service at little or no maintenance cost—and by future generations for continued tax-saving service, long after bonds issued for the installation have been retired and forgotten.

CAST IRON

Cast Iron Pipe Research Association
Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago 3

Serves for Centuries

HOW A WATER COMPANY stepped up production of gasoline



REFINERY MANAGER: *"Listen, Jim, we have to shut down altogether too often because that 'hard-as-nails' water of yours clogs up the cooling system with scale. Can't you do something about it?"*

WHAT THE WATER SUPERINTENDENT DID: *He called us and asked if Calgon Treatment would help solve his problem. We said we thought it would—and sent an engineer out to make sure. Today, the refineries in that city never shut down because of scale in the cooling water system—and they have had substantial increases in gasoline production.*

CALGON is one treatment that will control corrosion, prevent scale, eliminate "red water" or stabilize water after lime-soda softening. *No new problems are introduced as a result of Calgon Treatment!*

Only 0.5 to 10 ppm. Calgon are needed to accomplish any of these effects. This keeps the cost extremely low. You can start Calgon Treatment immediately. No waiting for elaborate equipment. Only a simple feeding mechanism is required.

Industrial plants need never shut down because of scale in heat exchangers and condensers. Home owners need never suffer with clogged-up water heater coils. In Calgon* you have a treatment that will keep your industrial and domestic customers' equipment operating in A-1 condition. Get the facts now.

Calgon solves 4 water works problems

1. **Prevention of scale** from hard, high-bicarbonate waters. Calgon, added at the plant, prevents scale formation in mains, meters and hot-water heaters, throughout the system.

2. **Corrosion control**—Calgon forms a thin protective film on metals and metal oxides at pH values of 5.0 and higher. This reduces the attack of oxygen to such an extent that corrosion ceases to be a problem.

3. **Prevention of "red water"**—Calgon prevents the precipitation of dissolved iron. Thus "red water," either from iron initially present in well water, or from corrosion, can be eliminated.

4. **Stabilization of water** following lime or lime-soda softening. Calgon's ability to prevent precipitation of calcium carbonate stabilizes water to the ends of the system.

*Calgon is the registered trade-mark of Calgon, Inc., for its glassy sodium phosphate products.

HAGAN
HALL
BUROMIN
CALGON

calgon, inc.

A SUBSIDIARY OF HAGAN CORPORATION

HAGAN BUILDING
PITTSBURGH, PA.

"Water Buffalos" *are rough on rats!*

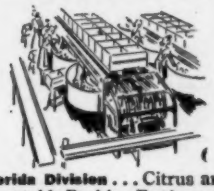
Big, tough, deadly . . . "Water Buffalos," the amazing new war vehicles military experts have called "the answer to the Pacific warfare!" Heavily armed and armored amphibious tanks, "Water Buffalos" swim through the sea, climb over coral reefs and charge up on the beach . . . ride over barbed wire, barricades and pillboxes, spraying death as they go. It can now be told that the Army, Navy and Marines used these "Water Buffalos" in great numbers in many amphibious operations in the South Pacific area.

These "Water Buffalos" were designed,* engineered and manufactured by Food Machinery Corporation. The extraordinary "know how" required to produce them was developed through 59 years of building equipment. This same creative ability is on the job today, planning many improved equipment items for America's great food industries.

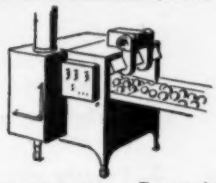
**In cooperation with Bureau of Ships, U. S. Navy.*

FMC Divisions *and Typical Products*

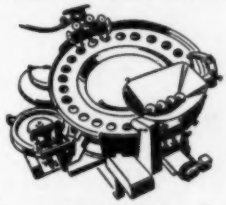
John Bean Mfg. Co. . . . Fog Fire Fighters, Bean Royal Spray Pumps, Automotive Service Station Equipment. Lansing, Mich.



Florida Division . . . Citrus and Vegetable Packing Equipment, and Food Protective Processes. Dunedin and Lakeland, Florida.



Texas Division . . . Protective Processes, Canning Machinery, Fruit and Vegetable Packing Equipment. Harlingen, Texas.



Sprague-Sells Division . . . Complete line of machinery for canning foods. Hoopeston, Illinois.

Anderson-Barngrover Division . . . Complete line of machinery for canning foods. San Jose, Calif.

LAKELAND AND RIVERSIDE

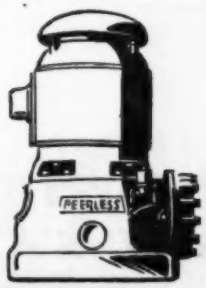
FOOD MACHINERY CORPORATION

EXECUTIVE OFFICES: SAN JOSE, CALIFORNIA

Riverside Division . . . Citrus Packing Equipment, Automatic Box Making and Lidding Machinery, Fruit and Vegetable Protective Processes. Riverside, Calif.

Bean-Cutler Division. Sprayers, Dusters and Packing House Equipment for Fruits & Vegetables, Fog Fire Fighters, Turbine Pumps. San Jose, California.

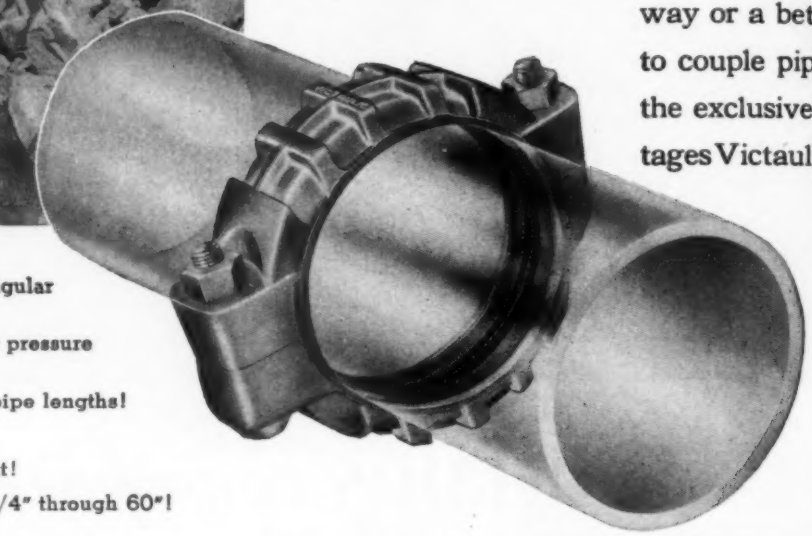
Niagara Sprayer & Chemical Co. . . . Insecticides for protecting crops from insects and disease. Middleport, N. Y.; Jacksonville, Fla.; and Burlington, Ont., Can.



PEERLESS PUMP DIVISION . . . Deep well turbines, hi-lifts and pumps handling water for every purpose. Los Angeles and Fresno, Calif.; and Canton, Ohio.

One good reason why the London "Blitz" Failed...

For just plain "guts" and ability to take it... you couldn't beat the English people. Nor could you beat the method they had for keeping London's life-lines in service. As fast as Hitler could blast their water, gas and sewer lines ... the English would repair 'em and hook them back together again with Victaulic Couplings. Nobody has ever yet discovered a faster way or a better way to couple pipe. Note the exclusive advantages Victaulic offers.



1. Fast Self-Aligning permits angular deflection!
2. Leak-tight, self-sealing under pressure or vacuum!
3. Positive mechanical lock of pipe lengths!
4. Every joint is a pipe union!
5. Every joint an expansion joint!
6. Available for all pipe sizes 3/4" through 60"!

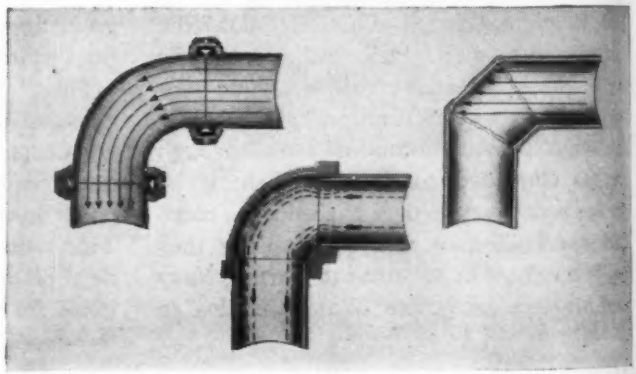
SPECIAL VICTAULIC ADVANTAGES IN THE FIELD OF PUBLIC WORKS!

★ **Lower installation cost... unskilled labor can do the job!**

★ **No expensive equipment needed . . . one small wrench is the only tool required!**

★ **Victaulic flexibility absorbs mis-alignment, ground subsidence and traffic vibration!**

★ **Maintenance is nil!**



MORE EFFICIENT FLOW WITH VICTAULIC FULL-FLOW FITTINGS!
Left-hand illustration shows Victaulic's smooth, unrestricted flow. Compare it with the turbulence and restrictions of screwed and mitre-weld fittings also illustrated. Victaulic Full-Flow means increased delivery, lower pumping costs. There's a Victaulic Fitting to meet every piping need.

BUY MORE WAR BONDS!

VICTAULIC

Reg. U. S. Pat. Off.

SELF-ALIGNING PIPE COUPLINGS AND FULL-FLOW FITTINGS

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NEW VICTAULIC CATALOG MANUAL

...a must for every firm that uses pipe. Contains all you need know about Victaulic Couplings and Full-Flow Fittings. Write to nearest address for your copy today on your firm's letterhead. Victaulic Company of America, 30 Rockefeller Plaza, New York 20, N. Y.; Victaulic Inc., 727 West 7th St., Los Angeles 14, Calif.; Victaulic Co. of Canada, Ltd., 200 Bay Street, Toronto.

IMPORTANT

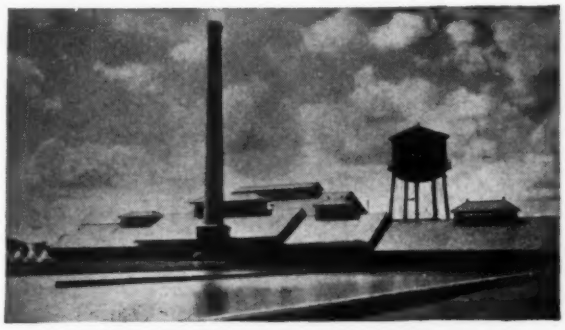
Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.



★ FOR WATER WORKS

1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.

★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

GENERAL CHEMICAL COMPANY

GENERAL CHEMICAL COMPANY

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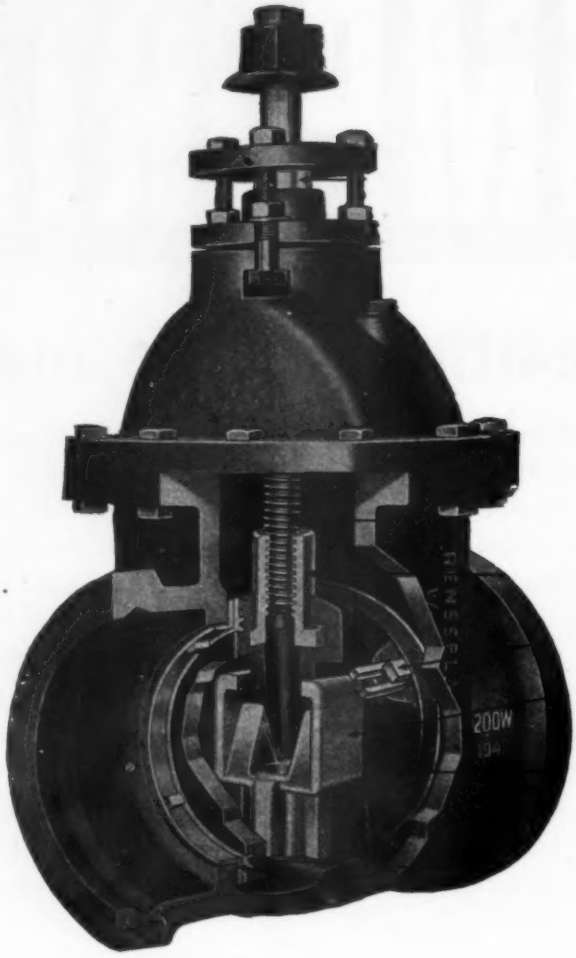

In a Gate Valve, too, "it's what is inside that counts."

THERE HAS NEVER BEEN DEVELOPED AN EFFECTIVE SUBSTITUTE FOR GOOD MATERIAL AND WORKMANSHIP BACKED BY SOUND DESIGN.

"Ask the man who uses RENSSELAER"

RENSSELAER VALVE CO., Troy, N. Y.

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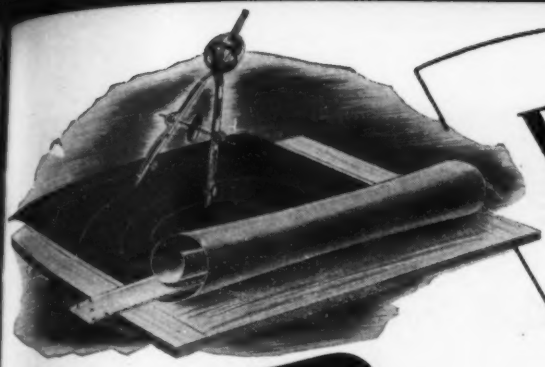


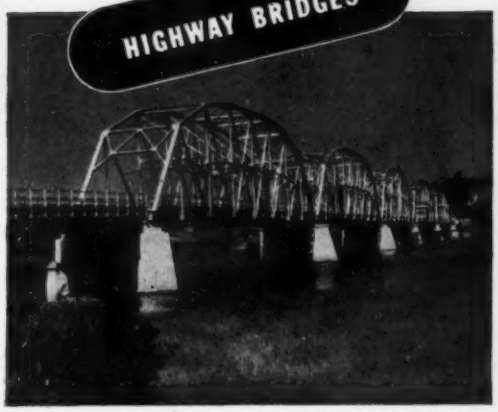
BLUEPRINT Now!

WATERWORKS

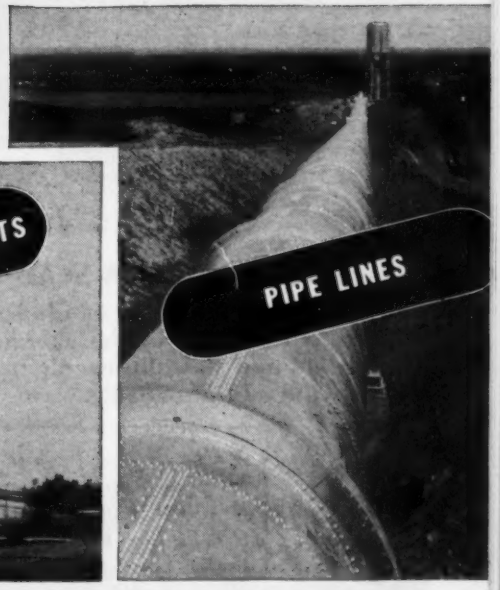
For Better Public Health—a Better Post-War Living Standard!

ELEVATED TANKS

HIGHWAY BRIDGES

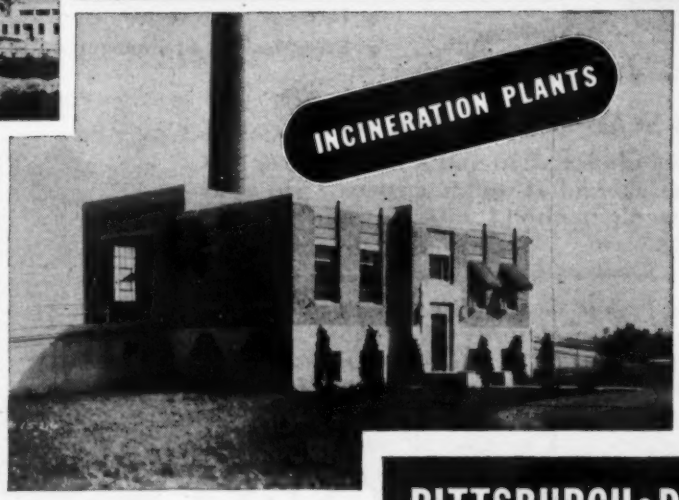


DISPOSAL PLANTS



PIPE LINES

INCINERATION PLANTS



A COMPLETE RANGE OF FABRICATED STEEL CONSTRUCTION

In planning *your* contributions toward building a greater America after the war, use the specific assistance of this experienced organization—available at every stage from design to completed structure—of obvious value in blueprinting now!

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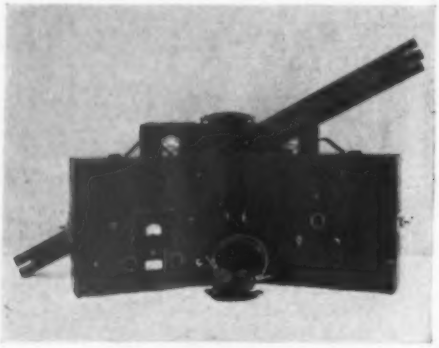
SAVE *time, money, headaches*

by using LATEST 1944 MODEL

FISHER M-SCOPE INSTRUMENTS

The Fisher M-Scope Pipe Finder is successfully solving the varied problems involved in the development, operation and maintenance of buried pipe and cable systems.



M-SCOPE PIPE FINDER

M-SCOPE LEAK DETECTOR

- **It locates the exact position of the object**
- **It traces the exact course of an underground line**
- **It determines the difference between a buried pipe and a single metal object**
- **It works positively and instantaneously**
- **It prevents accidental damage by diggers**
- **It eliminates exploratory excavations**
- **It saves time, labor, money**

M-SCOPE ENERGIZER TYPE PIPE LOCATER

Use the Fisher M-Scope Water Leak Detector to determine the exact location of a leak. Its use will enable you to

- **Locate exact position of pipe line leak**
- **Determine where to break pavement when leak appears on the surface**
- **Solve the problem of "unaccounted for" water or oil**
- **Reduce operating expenses**
- **Increase net revenue**
- **Every leak is an unmetered user**

THE FISHER M-SCOPE BOX LOCATOR

will locate valves, covered manholes, drip and service boxes, etc., as fast as you can cover the ground at walking speed. Do away with the old and slow dip-needle method. Liberal trade-in allowance on your old dip-needle.

Write to the Fisher Research Laboratory for latest 16-page booklet explaining the above methods. M-Scope Equipment is exclusively manufactured by the Fisher Research Laboratory. Please place your order now for immediate delivery from our Palo Alto, California or Chicago, Illinois warehouses.

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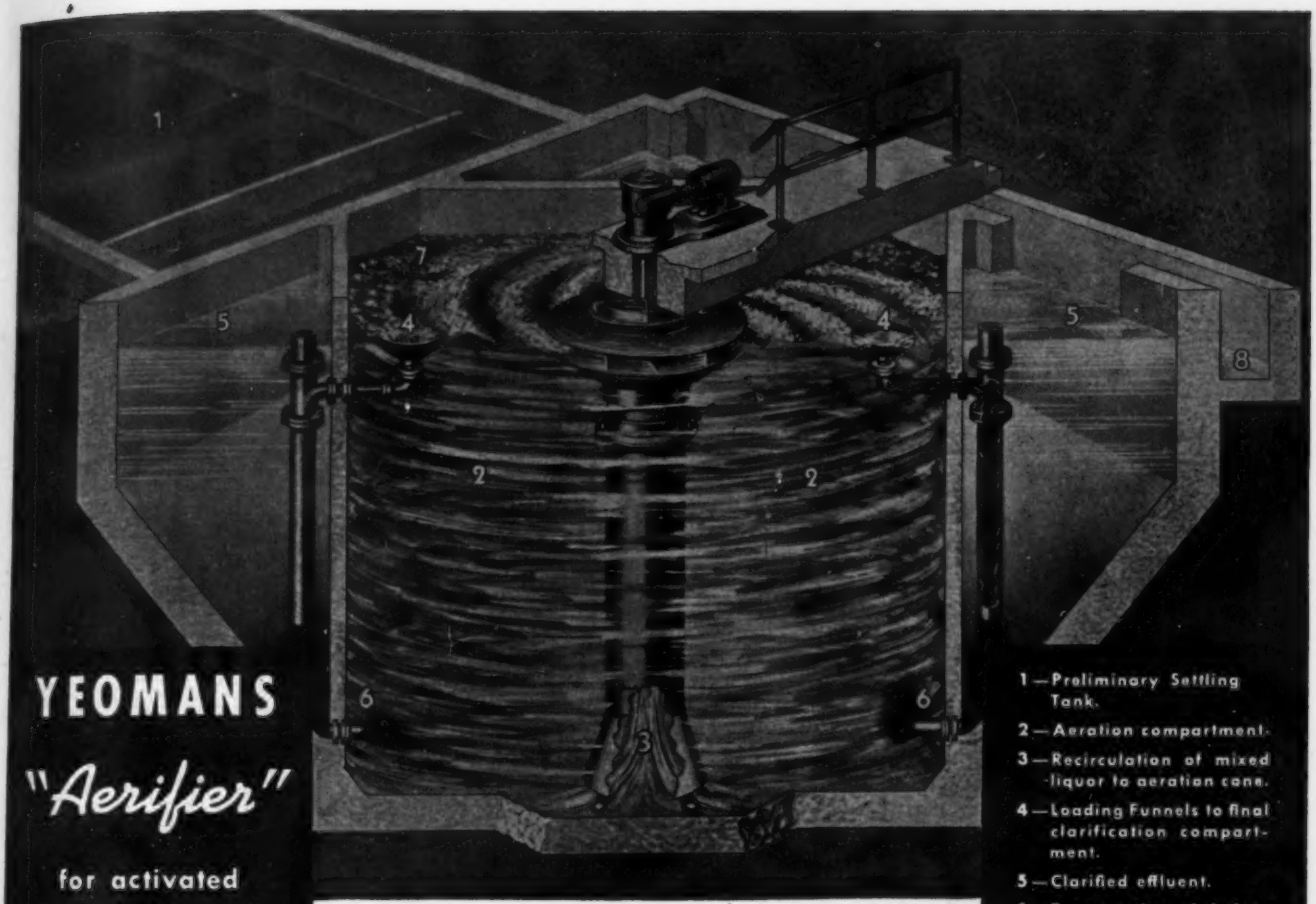

YEOMANS "Aerifier"

for activated sludge treatment of sewage

1—Preliminary Settling Tank.
2—Aeration compartment.
3—Recirculation of mixed liquor to aeration cone.
4—Loading Funnels to final clarification compartment.
5—Clarified effluent.
6—Return activated sludge.
7—Waste activated sludge loading funnel to primary tank.
8—Plant effluent.

AERATION AND FINAL SETTLING IN ONE CONCRETE STRUCTURE

HERE'S an answer to the sewage problem of small communities — the Yeomans "Aerifier". It is designed and built to do an efficient job economically—with a minimum of attention for operation and maintenance.

Square concrete tank, with central aeration section and triangular corner settling compartments, connected only by influent and effluent pipes. No steel baffles to rust and collapse.

Motor-driven "Spiralflo" aeration cone revolving at relatively low speed, sets up spiral circulation from top down—delivers a high degree of purification at exceptionally low power cost.

Exclusive design for conveying mixed liquor to settling compartments. Capacity under control of the operator.

No possibility of short circuiting from aeration compartment to clarifier. No annular openings.

Adequate velocity from "Spiralflo" movement—no sludge deposit on tank bottom. Activated sludge is returned from settling compartments to aeration compartment, and clear effluent is discharged. Waste activated sludge is returned directly to the primary tank.

For full detailed information concerning this simple, efficient, modern unit, send for new Bulletin 6650.

Yeomans Brothers Company

1423 NORTH DAYTON STREET
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YEOMANS PUMPS • GIVE YEOMAN SERVICE •

Please send Bulletin 6650 describing Yeomans Aerifier.
Name_____
Address_____
Company_____

The Story of the Kid from Port Chester

"Dear Mom," he writes, "Today I got a thrill.

"We were going ashore to attack . . . going ashore in a barge when just as we were reaching the beach something hit us hard. We turned over and everyone of us and all the equipment in the barge took a nose-dive in the drink.

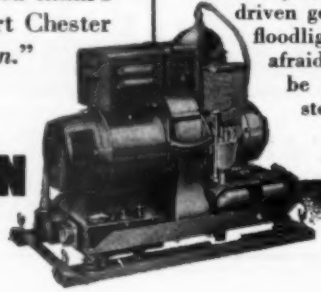
"Fortunately it wasn't deep, and we were able to walk ashore and drag the equipment with us. We were assigned to take some of the pieces of equipment and dry them out as best we could. Which we did. And never thinking they'd be any good again, we tried to get them going.

"Much to everyone's surprise the darn things started up and worked. But if you think that was a surprise, how do you think I felt when I noticed that this equipment came from Port Chester . . . Homelite Portable Generators, *made in my home town.*"

HOMELITE CORPORATION
PORT CHESTER, NEW YORK

Some day it's going to pour

Yes, it will be raining cats and dogs . . . but neverthless important construction and emergency repair work must be done. On such a job, the portable gasoline-engine-driven generator you need to operate floodlights or power tools cannot be afraid of the rain. The answer will be a Homelite. They can't be stopped by rain.



BEFORE THE PARADE

...JOBS MUST BE MADE

WHEN THEY COME BACK HOME, we'll all be there with cheers and shouts . . . but that's not enough. *We must be there with jobs.* For remember, when the parade is over, the men of your community will need plenty of work to carry them over the "war-to-peace conversion" period.

That's why *today* it is up to your municipal officials to start planning the Public Works Programs which will put your local citizens back to work—right in your own home town.

In water supply, sewerage and drainage projects, the Lock Joint Pipe Company is prepared to set up temporary plants in your community. Such a project will employ up to 90% of its workers from your locality . . . help your merchants through the local purchase of a large quantity of supplies and materials . . . and circulate most of the money in your own community.

By specifying Lock Joint Concrete Pipelines, you'll have jobs ready for your engineers, mechanics, laborers and other skilled workers—and you'll be installing pipelines which will give you a century of useful service.

Whether your project is large or small, for the present or future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

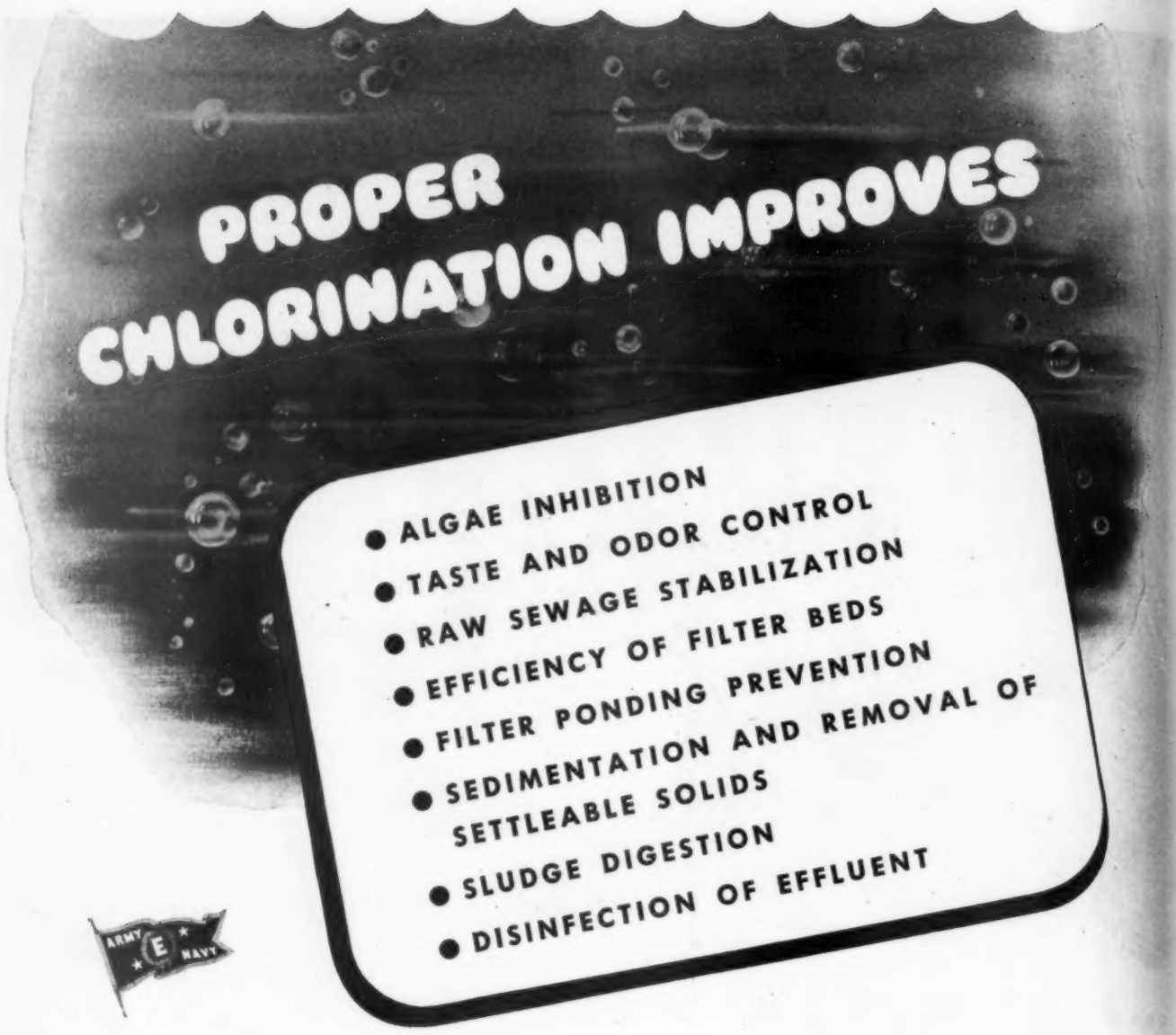
LOCK JOINT PIPE COMPANY

Established 1905

AMPERE, NEW JERSEY

Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill.
Joplin, Mo. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*



One important factor in proper chlorination is uniformly good quality chlorine. And that's what you get when you use HOOKER chlorine.

Not only do HOOKER standards of production control provide uniformly good quality pure chlorine, but HOOKER takes steps to assure that chlorine when delivered has the same quality as when shipped. Thorough cleaning of cylinders and containers eliminates the possibility of contamination enroute.

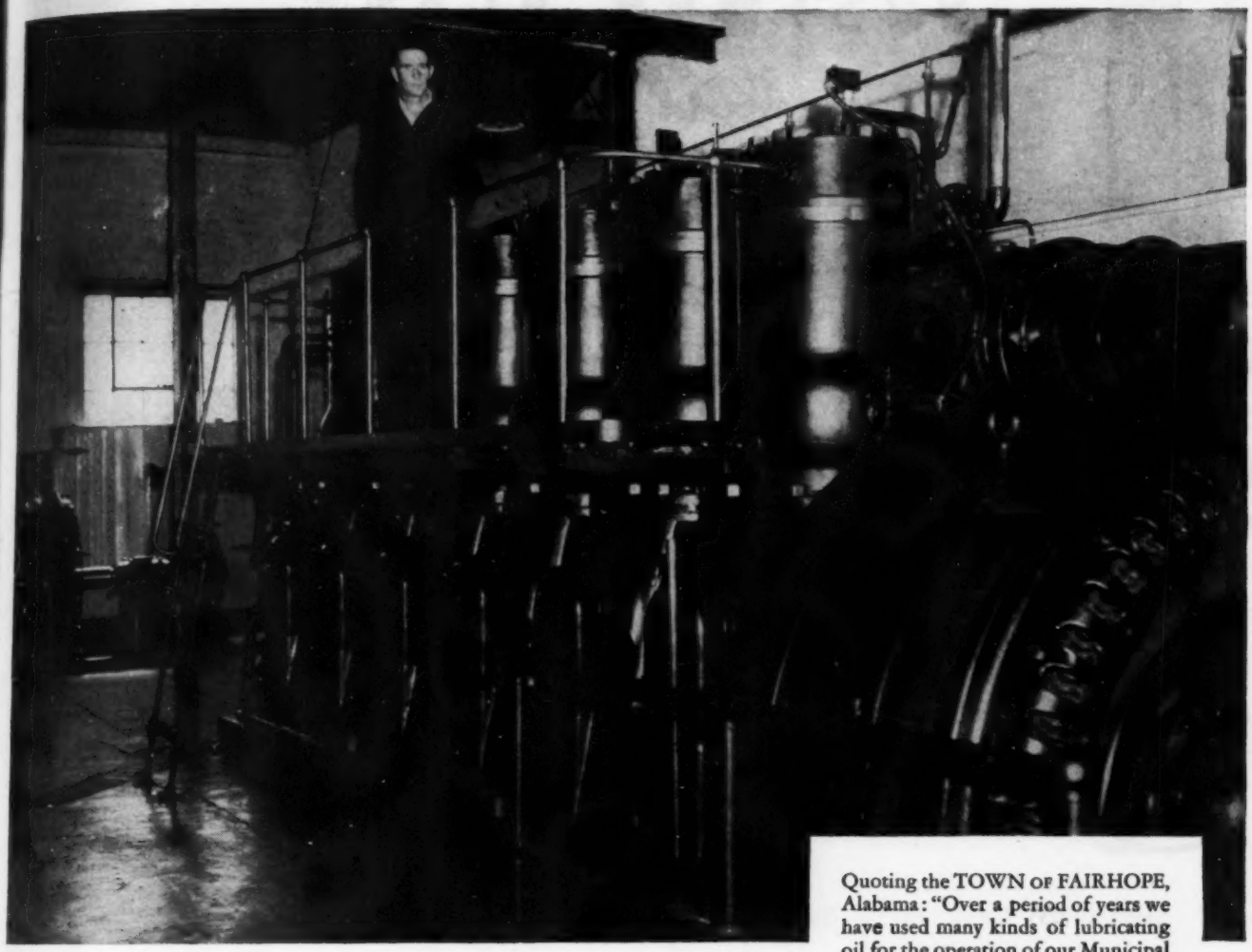
Liquid Chlorine, manufactured under HOOKER specifications, has proved itself consistently reliable in many water works, filtration plants, and sewage systems where it has been in year after year use.

Please feel free to take advantage of the advice HOOKER technical men can give you. HOOKER developments in chlorination stem from a 35 year experience with chlorine. Other HOOKER Chemicals for water works include Ferric Chloride and Bleaching Powder.

Hooker

HOOKER ELECTROCHEMICAL COMPANY
BUFFALO AVENUE & WARD STREET
NIAGARA FALLS, NEW YORK
New York, N. Y. • Tacoma, Wash. • Wilmington, Calif.

"..freedom from mechanical difficulties with RING-FREE"



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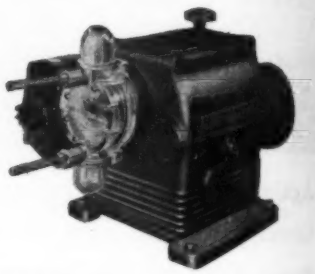

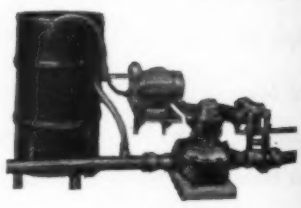

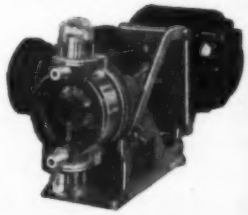

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WATER WORKS & SEWERAGE

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330 South Wells Street, Chicago, Ill.
E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

A Water Works Sea-Bee Wins His Spurs

Is the story of a water works employee who left his home for the armed forces of his country. It is a story of his progress in the service, of his work as one of the "Can-Do Boys," of how he became a waterworks superintendent himself in a far-off outpost, of his problems, and of his thoughts about the future when he returns home. It is a story told by his former boss—

ROGER ESTY, Superintendent,
Water and Sewer Board, Danvers, Mass.

Cement Lining Water Mains in Place

Relates experience at Palm Beach and W. Palm Beach, Fla., with the Tate Process of cleaning old water mains and lining them in place with cement mortar. Two separate projects, involving more than five miles of cleaning and lining in each instance, serve as the basis for this article which reveals the distinctive merits of this method of recovering and permanently maintaining carrying capacity, low friction and insuring freedom from rusty water complaints. The author is—

RALPH W. REYNOLDS, Manager,
West Palm Beach Water Co., Florida.

Sewer Design Practices

Are presented in an article which relates present day practices in the design of sewers in the United States. The contents of the paper were developed through the use of a questionnaire directed to a number of the country's leading consulting engineers, civic authorities and state sanitary engineers. It has been some time since such a survey was made and the findings in respect to prevailing and improved design methods and practices constitute a highly useful guide and reference document for incorporation in our 1944 Reference and Data Number. The compiler of this informative document is—

PROF. W. L. MALCOLM, Director,
School of Civil Engineering, Cornell University.

Alternate Pipe Materials

Constitutes a compilation of pipe and tubing now available to water works and sewerage authorities. The materials are described and the good features and shortcomings of each for various service applications are discussed. A useful feature of this compilation is that lists of the suppliers of the various types of pipes, tubing and conduits are given for the benefit of the users of this enlightening reference article. The compiler is—

A. A. HIRSCH, Director,
School of Water Supply and Sewerage,
Louisiana Dept. of Education.

The Use of Nomographic Charts

Is a helpful article with a new nomograph of broad application, which can be used to solve all full pipe flow problems if three of five factors are known. It is possible to determine velocity, diameter, loss of head, equivalent size pipes, friction coefficients, and pressure head. For pipes partly full it is possible to determine velocity, depth of flow, diameter, minimum slope. The contributor of this unique nomograph is—

H. M. GIFFT, Ass't Professor,
School of Civil Engineering, Cornell University.

A "Mud-Hog"

Is the name we have given a novel pump for lifting clay, mud, sand, sludges, etc. It was developed for trenching across a bay in place of the customary methods of trenching in sub-aqueous pipe line construction. This piece of equipment appeals to us as having other adaptations in the water and sewage fields. What it is and what it does we leave for the imagination until reading the article by—

HARRY U. FULLER, Chief Engineer,
Portland Water Distr., Portland, Me.

VOL. 91, NO. 5

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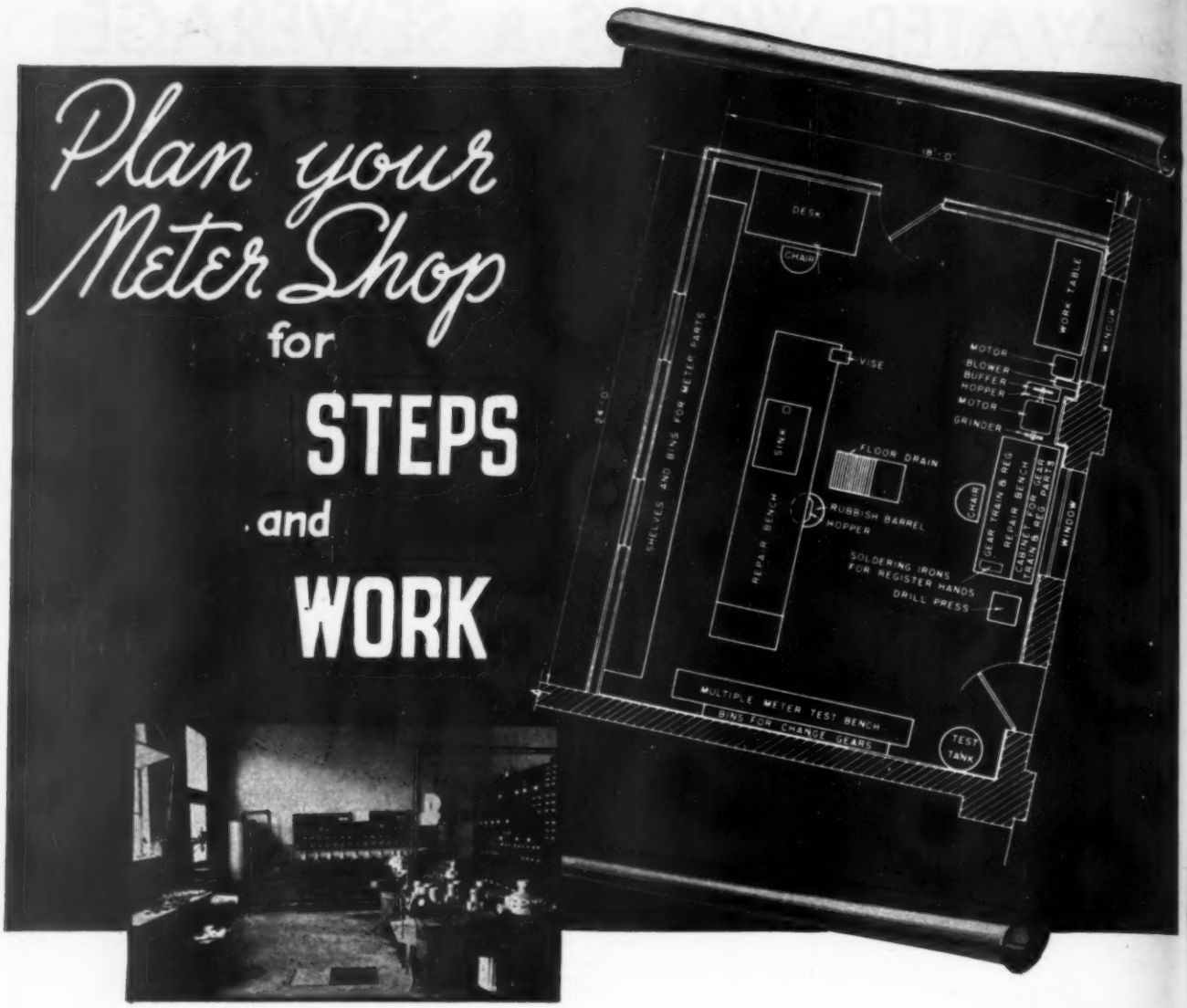
Plan your Meter Shop for STEPS and WORK



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Your experienced Trident representative is at your service to help you plan a modern meter shop.

94

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WATER WORKS & SEWERAGE

VOL. 91, No. 5 *A Gillette Publication* MAY, 1944

WATER WORKS AND SEWERAGE UNDER ONE MANAGEMENT

Some Experiences and Results from Joint Operation at Fort Dodge, Iowa

By JOHN W. PRAY
Manager of Utilities
FORT DODGE, IOWA

THE City of Fort Dodge, Iowa, with a population of 23,000 has owned and operated its own water works system since 1881 when it was started by the mayor and council. Since the beginning of the water works system, the same organization which carried on the affairs of this department has also maintained and operated the storm and sanitary sewer system now consisting of 35 miles of storm sewers and 53.75 miles of sanitary sewers.

It was only logical that when the sewage treatment plant was built the water works department took charge. This management of the sewage department by the water department seemed to be taken for granted and the utility organization expanded just a little more to absorb this important part of public service. In addition the utility department also owns a hydro-electric plant of 800 kwh. capacity, located a mile up-river from the water pumping station.

The Author

The Water Supply

For many years the Des Moines River was the source of supply. The water was taken into the plant from an infiltration system on an island in the river. This source was extended from year to year and made up at least a part of the supply until 1919.

In 1906, prospecting for ground water was started and by 1919 sufficient amounts were available to supply the city. No river water has been used since that time. The ground water supply has sufficient natural artesian head to put it over an aerator eighteen feet above ground level and located within the filtration plant building. Booster pumps, however, are located on the line and at times it becomes necessary to operate one of these pumps to increase the flow. Five wells are connected into one 20-in. cast iron line which carries the water to the aerator.

The total natural flow from the

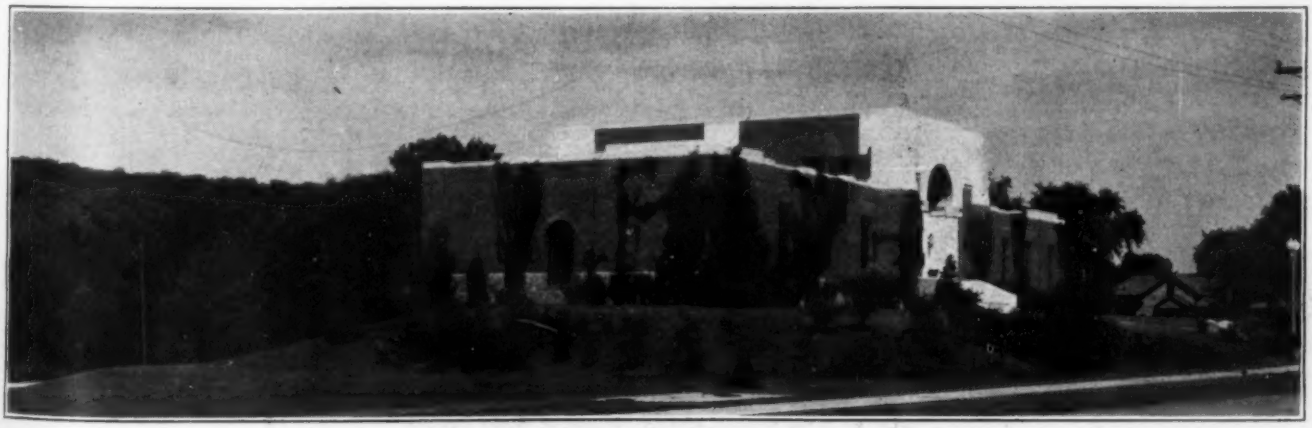


Fig. 1. The Water Plant of Fort Dodge

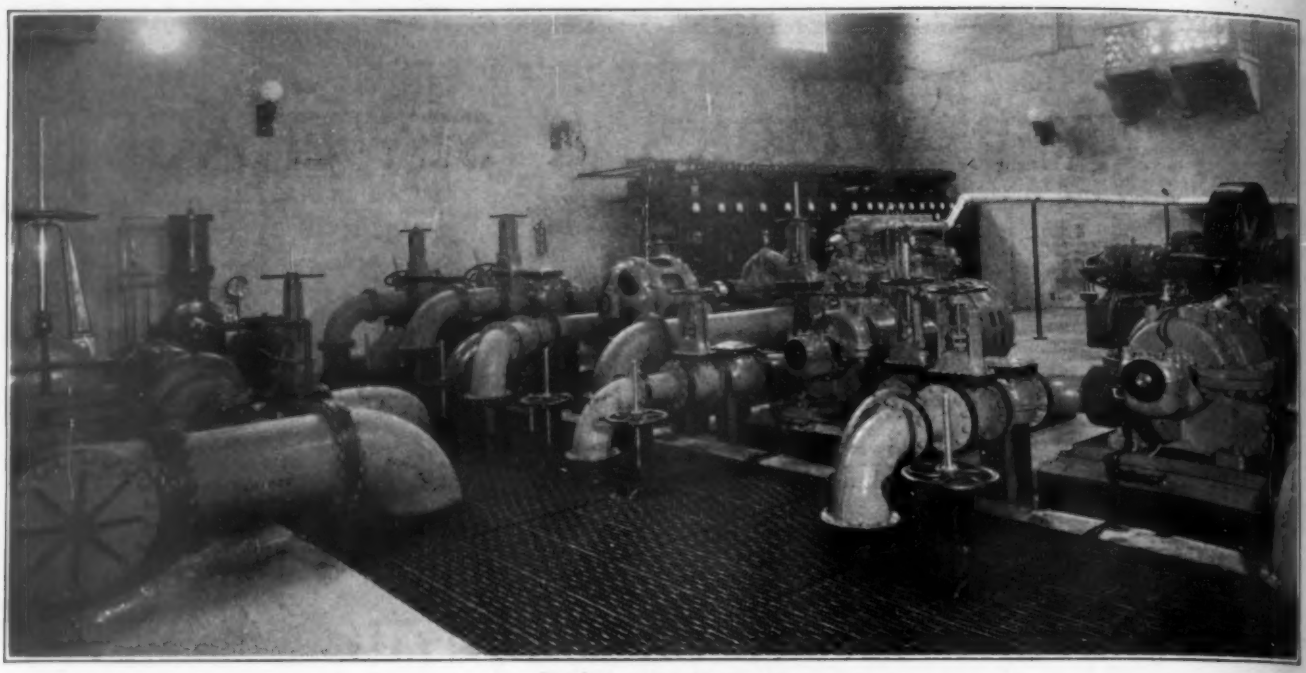


Fig. 2. Interior View of Water Pumping Plant

(Two 1¾ mgd. pumps and one each 4, 3 and 2½ mgd. The 3 mgd. pump, center rear, has gasoline engine dual power.)

wells at ground level is 5½ mgd. Treatment consists of simple iron removal by aeration, sedimentation, and filtration. The average daily consumption is 2.5 mgd. Peak consumption is 4.0 mgd.

The water plant shown in Fig. 1 is all electric with five motor-driven high service centrifugal pumps. The capacities of these pumps, shown in Fig. 2, are 4, 3, 2½ and two 1¾ mil. gal. daily. The 3 mil. gal. unit is a dual drive with a gasoline engine as a standby source of power.

The Hydro-electric Station

The hydro-electric plant shown in Fig. 3 furnishes power for pumping as well as a considerable amount for street lighting, 500 electroliers, and two sewage lift stations.

An interchange of power contract is in force with the local power company and power is sold or bought for 0.85 cents per kwh. Power is purchased during periods of low water in the river. Power produced in the past two years has averaged 5,000,000 kwh. per year and power purchased averaged 235,000 kwh. per year for the same period.

The Sewerage System

Most of the sewers have been constructed through assessment against the abutting property, and have been built under contract. These contracts were let under competitive bidding handled through the office of the City Engineer. On acceptance the sewers have been turned over to the utility department to operate and maintain. In more recent years

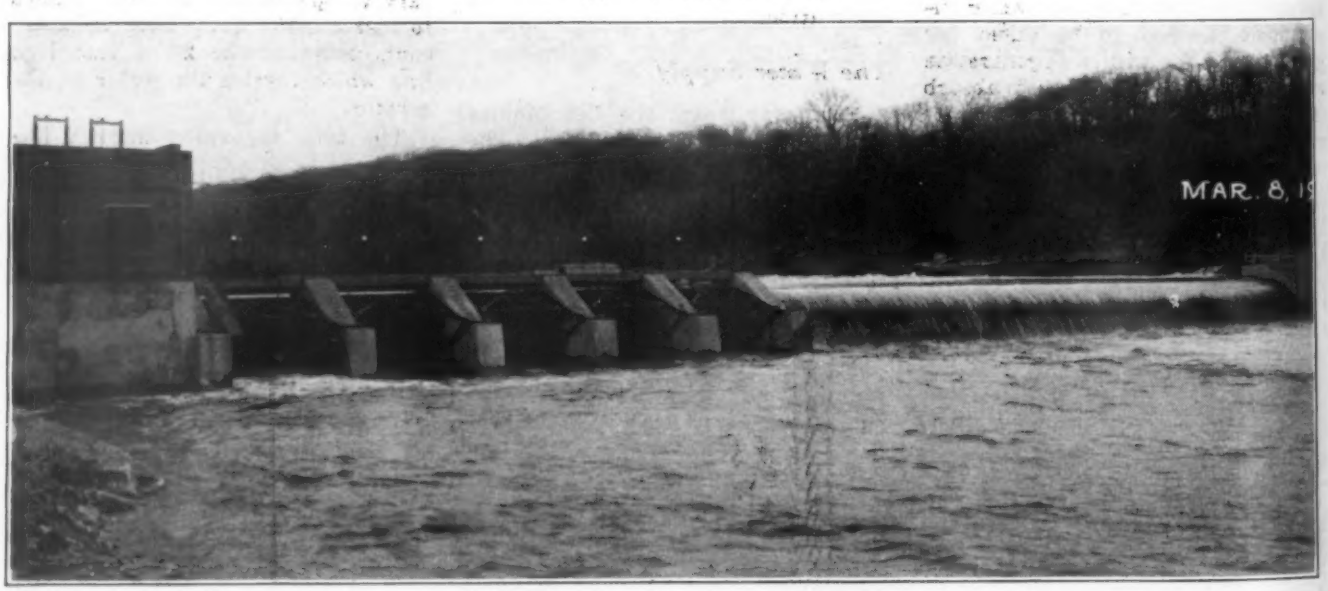


Fig. 3. The Hydro-electric Plant of Fort Dodge

(Power is bought or sold depending on water available.)

Fig. 4. The Fort Dodge Sewage Treatment Plant

(Two stage trickling filters, the primary stage being the near units.)

many relief sewers, mostly storm sewers, have been built by the utility department with relief day labor.

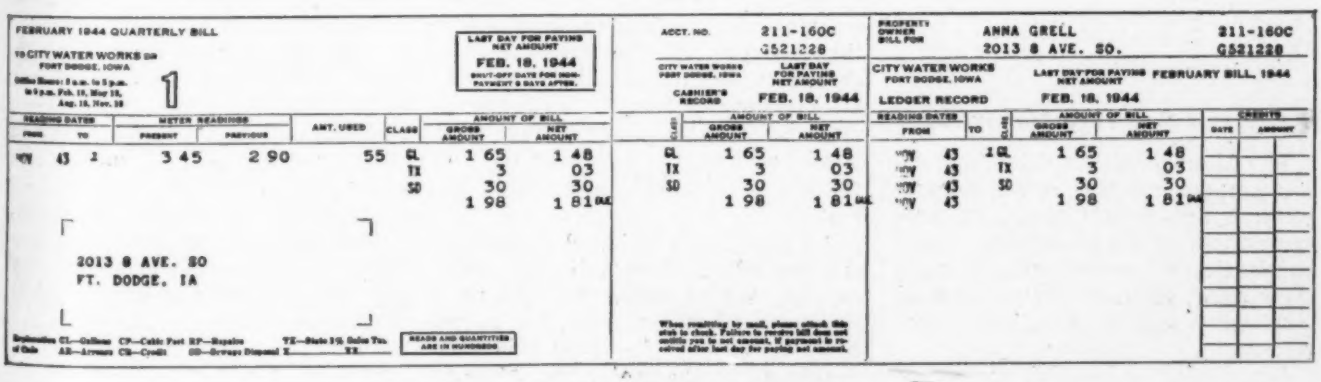
The sewage treatment plant shown in Fig. 4 consists of two primary sedimentation tanks, two separate sludge digestion units, and two stage trickling filters. The trickling filters are equipped with rotary four-arm distributors.

The plant was put in operation in 1938 and was expanded in 1942 to take care of unexpected industrial growth. Plans are now under way for still further (post-war) expansion, to provide for further anticipated industrial growth. On the completion of the plant a very capable engineer, who had been resident engineer during construction, was made Plant Superintendent.

In 1941 the Plant Superintendent accepted a position in a nearby city and the vacancy was filled by dividing the responsibility between the Chemist and the Mechanical Maintenance Man, whom the Superintendent had trained. This plan seems to be working satisfactorily.

Slaughter House Waste Treatment

In addition to an estimated tributary domestic population of 22,000, the sewage treatment plant receives an important loading in the form of wastes from a slaughter house. This loading, equivalent to a population of roughly 58,000 persons, consists of a waste high in solids, BOD, and troublesome grease. To remove some of the grease the sewage is passed through a short period aeration tank before sedimentation. Air at the rate of 300 cfm. is added and the grease which is skimmed off the tank may be added to the digesters, but at the present time it is sold. The accompanying table gives an idea of the amount and type of sewage treated in Fort Dodge. A part of the gas produced from the digesters



FEBRUARY 1944 QUARTERLY BILL

TO CITY WATER WORKS
FORT DODGE, IOWA

1

LAST DAY FOR PAYING NET AMOUNT
FEB. 18, 1944
SHUT-OFF DATE FOR NON-PAYMENT 8 DAYS AFTER.

READING DATES FROM	TO	METER READINGS PRESENT	PREVIOUS	AMT. USED	CLASS	AMOUNT OF BILL GROSS AMOUNT	NET AMOUNT
NOV	43	3 45	2 90	55	GL	1 65	1 48
					TX	3	03
					SD	30	30
						1 98	1 81 NET

2013 8 AVE. SO
FT. DODGE, IA

Explanation of Code: CF—Cubic Feet RF—Regular AB—Arrears CR—Credit SD—Sewage Disposal TX—State 3% Sales Tax

READS AND QUANTITIES ARE IN HUNDREDS

ACCT. NO. 211-160C G521228

CITY WATER WORKS FORT DODGE, IOWA
CASHIER'S RECORD

LAST DAY FOR PAYING NET AMOUNT
FEB. 18, 1944

CLASS	AMOUNT OF BILL GROSS AMOUNT	NET AMOUNT
GL	1 65	1 48
TX	3	03
SD	30	30
	1 98	1 81 NET

When remitting by mail, please attach this stub to check. Failure to receive bill does not entitle you to net amount, if payment is received after last day for paying net amount.

PROPERTY OWNER BILL FOR ANNA GRELL 211-160C
2013 8 AVE. SO. G521228

CITY WATER WORKS FORT DODGE, IOWA
LEDGER RECORD

LAST DAY FOR PAYING NET AMOUNT FEBRUARY BILL, 1944
FEB. 18, 1944

READING DATES FROM	TO	CLASS	AMOUNT OF BILL GROSS AMOUNT	NET AMOUNT	CREDITS DATE	CREDITS AMOUNT
NOV	43	GL	1 65	1 48		
NOV	43	TX	3	03		
NOV	43	SD	30	30		
NOV	43		1 98	1 81 NET		

Fig. 5. Combined Water and Sewer Bill

Return To:

CITY WATER DEPARTMENT
City Hall
FORT DODGE, IOWA

WATER RATES

First	10,000 Gal.	@ .30c	per 1000
Next	20,000 Gal.	@ .25c	per 1000
Next	40,000 Gal.	@ .15c	per 1000
Next	30,000 Gal.	@ .12c	per 1000
Next	100,000 Gal.	@ .10c	per 1000
Next	300,000 Gal.	@ .07c	per 1000
Next	500,000 Gal.	@ .06c	per 1000
All over	1,000,000 Gal.	@ .05½c	per 1000

On all Regular Quarterly bills which are paid on or before the 15th of February, 1944 ten per cent (10%) shall be deducted.

On all final bills discount shall be allowed up to and including ten days from the date of the issuing of the bill; after ten days the bill shall become delinquent and the gross amount paid. Consumers using less than 3,000 gallons in three months, a charge of ninety cents (90c) shall be made and this shall be the minimum. All consumers outside the city limits shall pay 15% additional above these rates.

SEWAGE DISPOSAL RATES — INDUSTRIES

First	500,000 Gal. of water	6c	per 1000
Second	500,000 Gal. of water	5c	per 1000
Third	500,000 Gal. of water	4c	per 1000
Next	36,000,000 Gal. of Water	2½c	per 1000

All other users of water to be charged 5c per 1000 Gal.

25% shall be added to the sewage rental bill of all classes of users of the sanitary sewer system who are located outside of the city limits of the City of Fort Dodge. No discount on Sewage Disposal rates.

The minimum service charge, rate or rental for each connection, either directly or indirectly, to the sewage system of said city, shall be thirty cents (30c) per quarter.

Fig. 6. Water Rates and Sewer Rates for Domestic and Industrial Users

In this schedule, reproduced from the rear of the bill form illustrated, it will be noted that sewer service charges to those outside the corporate limits, domestic or industrial, are 25% higher than to those within the city limits. Charges to out of city water users are only 15% higher.

On water bills a 10% discount is the reward for prompt payment, but for sewer service charges no discount is granted.

is used to produce power through a gas engine generator. The excess of this by-product above that used in the plant is sold.

TABLE OF SEWAGE TREATMENT DATA

Item	Yearly Avg.
Flow—mgd	2.26
B.O.D.—Raw—ppm	721
Final—ppm	116
Removal—%	83.8
Susp. Solids—Raw—ppm	589
Final—ppm	93
Removal—%	84.2
Grease Sold—Lb./da.	440
Chlorine added—Lb./da.	336
Sludge—Gal. per day	21,540
Per cent solids	6.37
Gas Data—	
Produced—cf/da.	118,231
Used—cf-da.	80,944
Used per kwh. generated—cf.	23.3
Power Data—	
Generated—kwh./da.	3,472
Used by plant—kwh./da.	1,538
Sold—kwh./da.	1,934
Purchased—kwh./da.	77

Water and Sewerage Management

The Manager of Utilities has under his control the water department, hydro-electric plant, Electrolier system of street lighting, storm and sanitary sewers, sewage treatment plant, garbage disposal, and all accounting and distribution of expenditures.

On the water system there are 5,471 consumers, all metered. There are 69.5 miles of water mains, 469 fire plugs, and 910 valves. The whole system is appraised at $2,000,000, has no outstanding debt, no tax levy or hydrant rental, has $100,000 invested in government bonds, a bank balance of $40,000 and contributes $20,000 each year to other municipal funds as well as furnishing all city departments water without charge, including street and sewer flushing.

All administration of the affairs of the sewage plant are handled through the utility office and the sewer rental rate, as set forth in an ordinance, is based on water consumption. The regular water billing machine was changed to provide for the inclusion of the sewer rental charge on the water bill. A sample bill is shown in Fig. 5. The table of rates for water use and sewage disposal service, which appear on the reverse of the bill, are shown in Fig. 6.

All purchasing is handled through the one office. Eventually the office expense will be distributed and prorated to each department; but up to now, because of the good financial condition of the water department and the rather limited finances of the others, the water department has absorbed it all. This can be rearranged rather easily at any time, inasmuch as the departments are all under one head.

Advantages of Combined Administration

There is much to be said in favor of such a combined setup of municipal utilities as we have here in Fort Dodge. First, I believe much economy results. There is no duplication of effort—one machine and one operator make both water and sewer rental bills. One office force and one set of equipment do the work of all departments. All being under one head, there is also cooperation in the use of equipment such as trucks, compressors, portable pumps and tools of all kinds. Men can be shifted from one department to another and supervised by the same foreman. Other than the Manager and office force, men are paid from funds of the department for which they do the work, and our Maintenance Crew is kept busy in one or the other of the departments.

From the taxpayers' viewpoint, I am convinced that a combined utility organization such as ours, means considerable saving. After all, inasmuch as the taxpayer owns the whole layout and employs us, we *should* organize to his advantage, and joint utility management and operation is decidedly in this direction.

About the only objection I have observed and it may or may not be a serious one, is that the Manager's or Superintendent's time might be so divided that he could not give sufficient time to any one problem. However, I believe if he has well qualified men in his organization for each part of the work, it will work out satisfactorily and I feel sure that the community will realize more and better service out of both men and equipment.

Considered from all angles, it is my opinion that the placing of all municipally owned utilities under one head is good business; and, even so possible added expense to the water utility, is in the best interests of the city as a whole. Of course it is essential that politics be kept out of the management of such a combined setup which is just as true if the utilities are operated separately.

[Ed. Note: It is also true, in so far as our observation is concerned, that political interference in sewerage departments is far less of a problem when joint management and operation of water and sewage systems is established.]

THE SEWAGE TREATMENT PLANT AT JONESBORO, ARKANSAS

General Description, Design Data, and Operating Results

By CHESTER A. SMITH
Burns and McDonnell, Engineers
KANSAS CITY, MO.

and

LLOYD M. REBSAMEN
Manager of Utilities
JONESBORO, ARK.

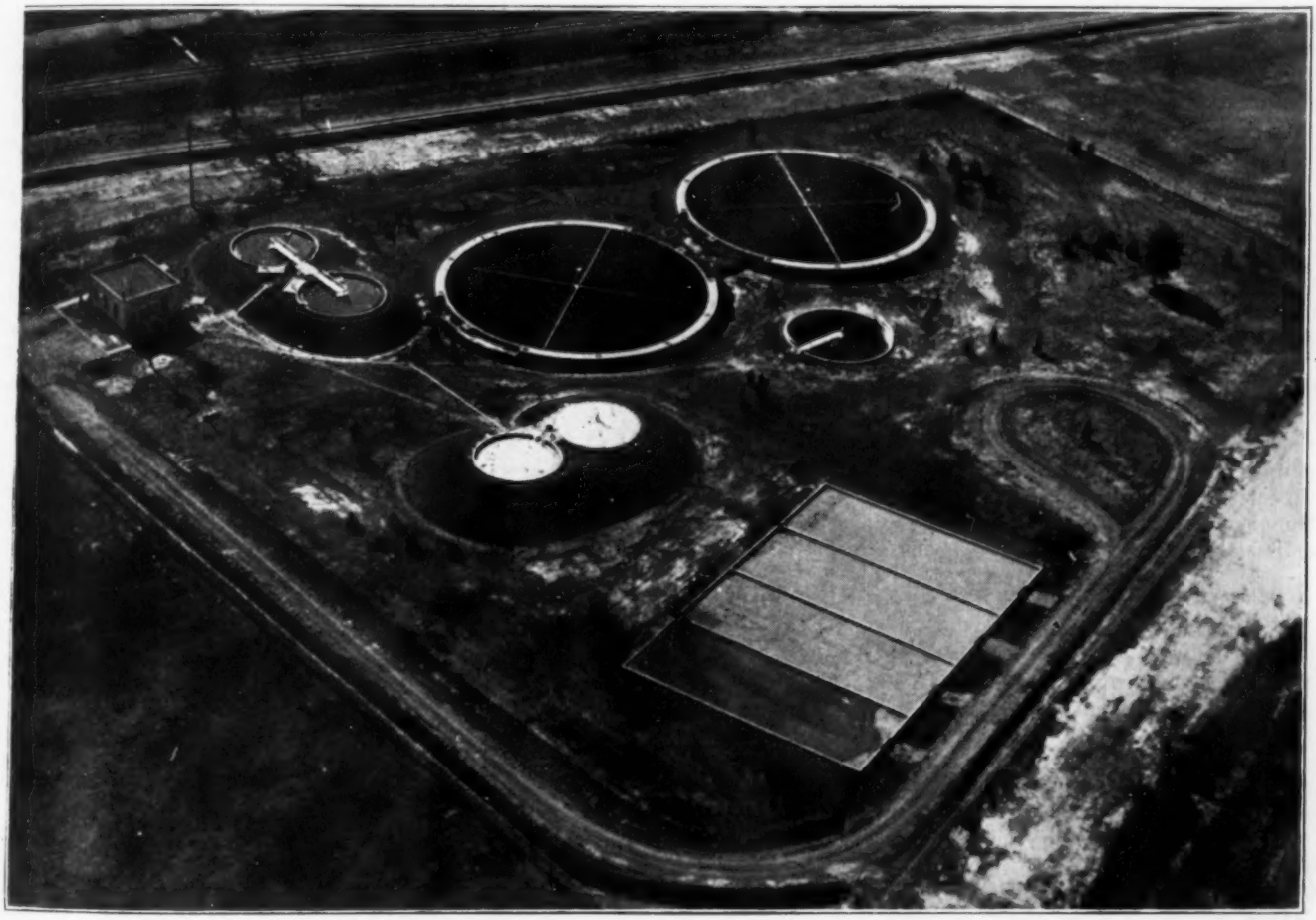
JONESBORO is located in northeastern Arkansas, approximately 70 miles northwest of Memphis, Tennessee. According to the Federal Census, the city's population was 11,729 in 1940, of which approximately 10,500 were served by the sewer system. However, adjoining the city limits, is the State Agricultural College, adding approximately 1,000 to 1,250 more to the connected load.

The business district, being approximately the center of the city, is situated on the crest of Crowley's Ridge, a divide between the natural drainage areas of the St. Francis and Cache rivers. The original sewer system was designed in accordance with the topographical conditions, with two main outfall sewers—one to the east and one to the west. A small section of the city had an outlet to the north. These old outfalls together with the new interceptor and force mains are shown in Fig. 1.

Gagings of sewage flows were made for 72 consecutive hours in May, 1940, and the average total daily sewage flow for the three days was 750,000 gal., divided as follows: east outfall 29 per cent, west outfall 70 per cent, and the north outfall 1 per cent.

The east and west outfall sewers with only plain sedimentation treatment by means of Imhoff tanks, discharged into drainage ditches. The north outfall sewage received no treatment prior to discharge into a branch of the west drainage ditch.

The flow in the drainage ditches for the greater part of the year was very small, consequently insufficient for dilution for effluents from only plain sedimentation treatment. Furthermore, there was no provision for sludge drying beds, and it was the practice to discharge sewage direct into the ditches during flood flows. Pools of putrescent liquids, sludge deposits, and noisome conditions existed



Aerial View of Jonesboro Sewage Treatment Plant

in the ditches for several miles below the outlets. The ditch receiving the effluent from the east outlet runs through the small town of Nettleton, several miles to the east. Odors from the ditch caused strenuous complaints from the officials of the town.

Sewage Treatment Problems:

It was very apparent that some type of treatment to produce a stable effluent would be necessary to alleviate the existing conditions. However, there were several local factors to be considered, namely: should the city continue to dispose of the sewage from the college and a CCC Camp; should two separate treatment plants be constructed, or should all sewage be brought to one site and plant; and could a site be selected, with proper isolation, closer to the city, where water and power service would be available within reasonable distance and at corresponding lessened costs.

Comparative estimates of construction costs and operating costs were prepared on three alternate schemes:

A—two separate plants, including the College and CCC Camp,

B—one plant, excluding the College and CCC Camp, and

C—one plant including the College and CCC Camp.

The original costs of plans "A" and "C" were approximately the same and greater than plan "B," but the operating costs per million gallons of treated sewage was lowest for plan "C."

Because of prior agreements with the State of Arkansas, relative to sewage treatment and other services of water and power to the College, and, inasmuch as the CCC Camp was temporary, the engineers recommended and the Utility Board of Jonesboro adopted plan "C."

Consideration was given several types of sewage treatment which would produce a stable effluent, but the recommended plant consisted of primary clarification, separate sludge digestion, trickling filters of conventional or standard design, secondary clarification, and sludge drying beds.

Sewage Pumping Stations:

The outfall lines from the College and CCC Camp entered the east outfall sewer approximately 4,800 ft. east of the city limits, at Elev. 70.5, city datum. A small pump station, called "College Pump Station," was constructed and equipped with two automatically controlled Chicago "Flush Kleen" 150 gpm. pumps, lift the sewage through 4,850 ft. of 6-in. cast iron force main to the East Side Pump Station, at Elev. 83.0. The East Side Pump Station is located near the east city limits on the east outfall, just below the last connecting sewer line serving the east side of the city.

The East Side Pump Station receives the city's sewage from the east part of the city plus the sewage from the College Station. It is equipped with two automatically controlled "Flush Kleen" 400 gpm.

The Authors

Chester Smith *Lloyd Rebsamen*

pumps which discharge through 2,440 ft. of 10-in. cast iron force main to Elev. 98.5 from which the sewage flows by gravity through approximately 10,200 ft. of 15-in. vitrified sewer to the main pump station located at the new treatment plant site near the northwest city limits.

The original ground elevation of the new treatment plant site was approximately Elev. 91, and was subject to overflow during extreme flood conditions. The finished grade on the site is at Elev. 93.0. The invert elevation of the new main outfall sewer at the treatment plant site is at Elev. 82.5 In order to construct the plant above flood water and provide the necessary operating head, it was necessary to construct a pumping station and lift the total sewage flow approximately 20 feet.

The main pumping station houses a comminutor, size 15 M, with provision made for a second unit installation, 3—700 gpm. "Non-Clog" sewage pumps, duplicate units of Chicago "Scru-Peller" sludge pumps with time control device, gas-fired boiler for heating sludge digesters, office and laboratory, locker room with lavatory, toilet and shower rooms, recording and totalizing equipment for venturi meter, and other automatic operating devices.

The sewage pumps are operated by "floatrol" set so that the first pump starts when the sewage level in the wet well reaches Elev. 81.5, the second pump at Elev. 82.0, and the third pump at Elev. 82.5; are all off when sewage level drops to Elev. 75.0.

Sewage Treatment Design:

The total sewage flow, as measured in May 1940, indicated an average daily flow of 750,000 gal. or 64 gal. per cap. per day for the total connected population. The plant was designed on a basis of a future population of 16,000 at 65 gpcd. or 1.05 mgd. total average flow.

Analysis of 24-hour composite samples gave the following B.O.D. results: east side sewage 177 ppm., west side sewage 252 ppm. For design purposes 250 ppm. B.O.D. was used inasmuch as the sewage is a typical domestic waste with no industrial wastes of consequence to increase the B.O.D. content.

Primary Clarifiers: Two units, each 35 ft. in diameter, with 8 ft. side wall water depth, two-hour retention period based on 18-hr. average flow rate and 600 gallons overflow rate per square foot of surface area per day.

Trickling Filters: Two units, 124 ft. in diameter, 6.2 ft. average rock depth above vitrified filter block; designed on the basis of 400 pounds of B.O.D. per acre foot day, an expected 40 per cent reduction of B.O.D. in the primary clarifiers (i. e., an applied effluent containing 150 ppm. B.O.D.).

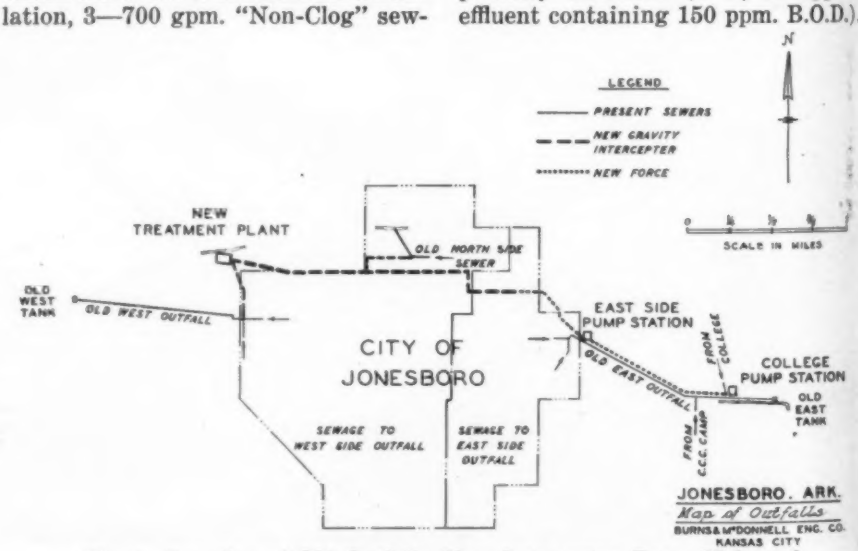


Fig. 1. Location of Old Outfalls, New Interceptor, Force Main and Treatment Plant

Final Clarifier: One unit 45 ft. in diameter, 7.4 ft. side wall water depth, 1.5 hr. retention period at 600 gallons overflow rate per square foot of surface area.

Digesters: Two units each 35 ft. in diameter by 23 ft. water depth; capacity 3 cubic feet per capita. The primary digester has a fixed cover and is equipped with heat exchanger, and the secondary digester has a floating cover.

Sludge drying beds were designed for one square foot of surface area per capita.

An emergency by-pass line was designed to by-pass all sewage flow, if necessary, before reaching the main pump station. Provision was also made in the design of the plant yard piping to by-pass either one of the clarifiers, either one or both of the filters, and also a by-pass for the filter effluent around the secondary clarifier.

Due to the difference in elevation between the filter effluent drain and the high water elevation in the raw sewage pump well, it was possible to provide, at small additional cost, a

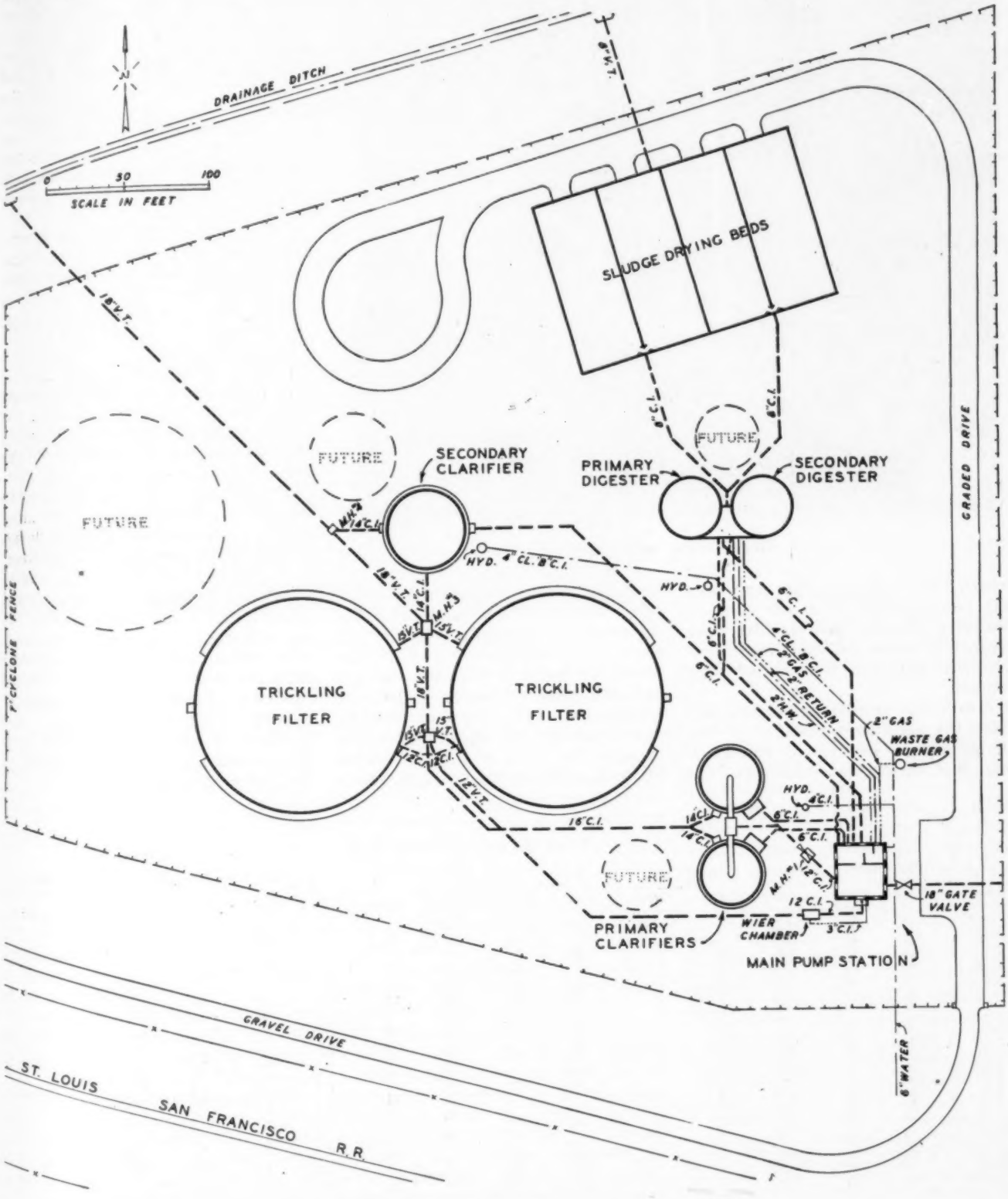
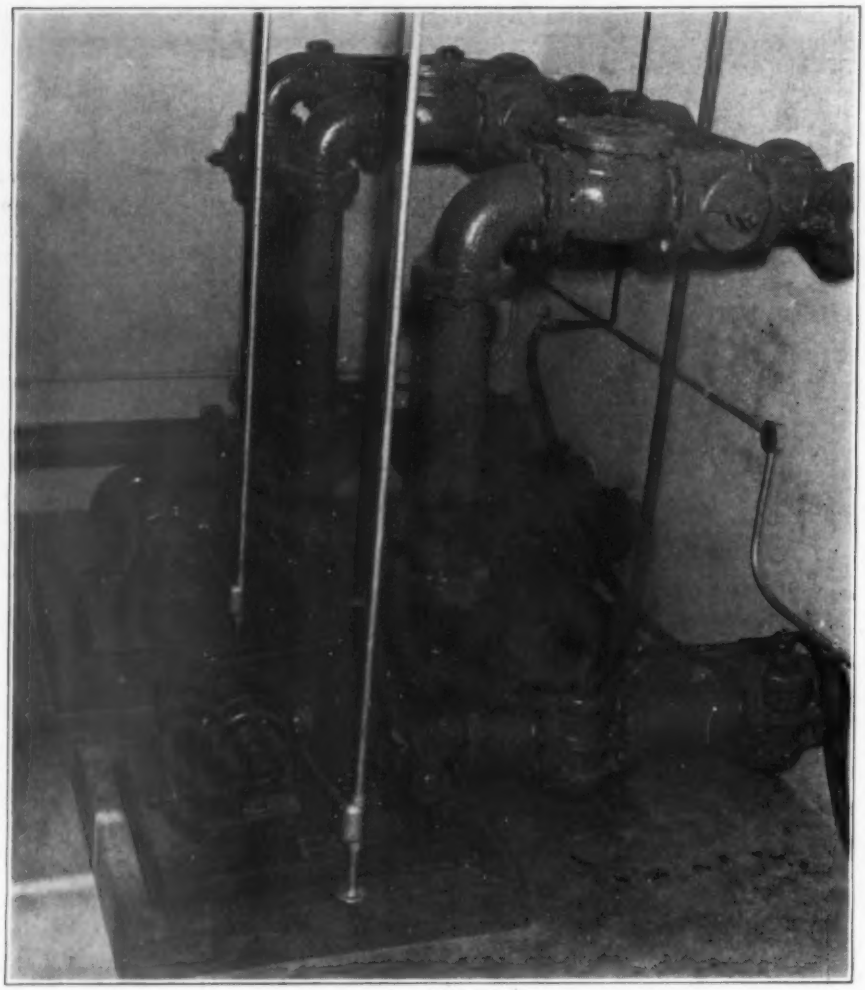


Fig. 2. Layout of Jonesboro Sewage Treatment Plant



Sludge Pump Installation

return line from the filter and permit recirculation of 50 per cent of the filter effluent. A weir with float recording device on this line measured the amount of recirculated filter effluent.

A 6-in. cast iron sludge return line from the secondary clarifier to the sludge pumps located in the main pumping station was valved and extended to the raw sewage well so that recirculation could be made by gravity from the secondary clarifier, as there is a difference of 4.9 ft. between the water level in the clarifier and the pipe entrance to the raw sewage wet well. A return flow of approximately 350 gpm. is possible through this line, or a recirculation ratio of ½ to 1 at the designed maximum capacity. There is no measuring device on this line but lower rates of recirculation can be obtained by partial closing of a valve.

A venturi meter was placed in the raw sewage pump discharge line to measure the raw sewage or raw sewage plus recirculated effluent.

The sludge pumps and digester piping were designed for the maximum flexibility in operation. Each pump can draw sludge from either primary or the secondary clarifier, and discharge to either the primary or the secondary digesters; and sludge can be transferred from the primary to the secondary digester, or vice-versa. Likewise, sludge may be drawn from either digester to the sludge drying beds. The supernatant liquor is returned to the raw sewage pump well.

The gas collecting system is provided with the necessary flame traps, measuring devices, waste gas burners, and accessories. The layout of the treatment plant is shown in Fig. 2.

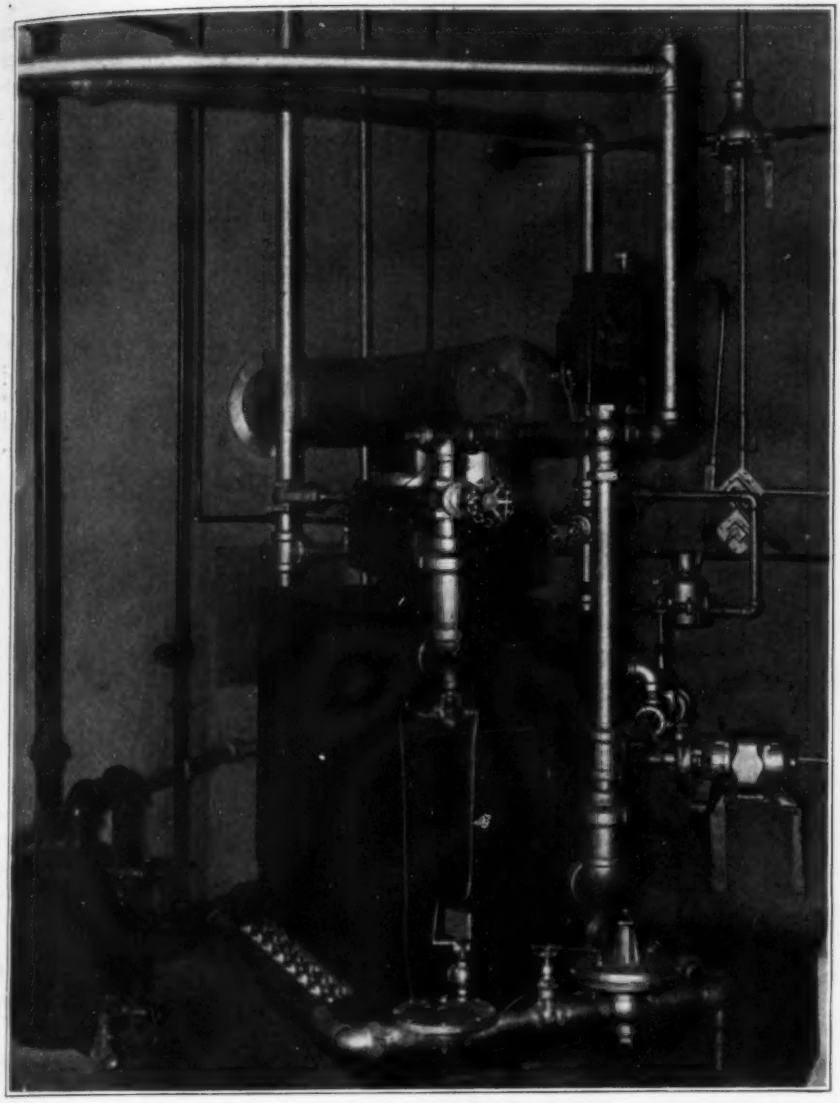
Operating Results:

The construction work was completed in the fall of 1941, and the plant placed in operation. Due to the installation of the return lines from the filter and secondary clarifier, an opportunity was provided to operate as a conventional trickling filter, to recirculate the filter effluent, or recirculate from the final clarifier.

In practically every plant, due to local factors, there are operational adjustments to be made before the best efficiency is obtained. The Jonesboro plant gave satisfactory results from the start, but, with the efficient and careful operation it received in making certain adjustments and changes, the final results have been considerably improved, as shown in the accompanying table.

OPERATION RESULTS FOR 1943

Date	C.° Temp. Sewage Raw	C.° Temp. Sewage Final	M/Gal. Sewage Flow	Settleable Solids Raw	Settleable Solids Final	B.O.D. Raw	B.O.D. Settled	B.O.D. Filtered	B.O.D. Final	D.O. Filtered	D.O. Final	pH Raw	pH Final	Digester pH	Digester Gas M. cu. ft.
1-4-43	16	10	910	9	Clear	516	302	35	22	8.5	8.8	7.6	7.2	6.6	9.0
1-11	16	12	890	8		215	78	22	16	7.1	7.2	7.6	7.2	6.4	10.4
2-25	18	14	950	9		427	179	42	33	6.6	8.2	7.6	7.2	6.6	13.1
4-1	18	16	960	7		556	272	45	35	5.0	6.0	7.4	7.0	6.6	14.9
4-26	20	19	1050	8		297	174	36	32	4.9	6.0	7.6	7.0	6.6	15.0
5-5	20	19	1110	9		469	263	30	28	4.9	5.6	7.6	7.2	6.6	11.2
5-21	21	20	1090	9		272	239	24	22	4.8	5.7	7.6	7.0	6.6	16.0
6-12	21	20	1190	8		367	122	19	8	4.5	5.6	7.4	7.0	6.6	11.8
7-1	22	21	1420	9		157	65	10	4	5.9	6.4	7.6	7.2	6.6	13.3
7-16	24	24	1100	9		212	70	12	8	5.0	5.6	7.6	7.2	6.6	10.3
7-30	24	24	1260	10		264	98	12	6	4.6	5.4	7.6	7.2	6.4	10.0
8-18	25	25	1390	10		334	70	13	7	5.8	6.3	7.6	7.2	6.6	6.8
8-23	25	25	1250	10		222	70	16	8	5.2	5.9	7.6	7.2	6.6	11.1
9-1	25	25	1340	9		294	118	18	10	4.3	5.1	7.6	7.0	6.6	10.9
9-8	25	24	1270	9		318	139	24	14	5.3	5.8	7.6	7.2	6.6	11.0
9-22	24	24	1290	10		276	84	20	7	5.0	5.3	7.6	7.0	6.6	11.6
9-30	24	24	1200	10		242	87	10.5	4.6	5.2	5.4	7.6	7.0	6.6	12.1
10-22	24	23	1080	8		292	133	16	9	5.6	6.1	7.6	7.2	6.6	12.2
11-3	20	19	790	8		232	79	18	12	6.9	7.1	7.6	7.2	6.6	10.9
11-17	19	18	1090	9		367	187	41	17	6.5	7.0	7.6	7.2	6.4	11.7
11-24	18	17	1110	8		606	201	47	15	6.8	7.2	7.6	7.2	6.6	10.9
12-8	17	14	1030	9		335	210	38	16	6.6	6.8	7.6	7.2	6.6	10.3
Average						330	147	24.9	15.1						
Reduction %							55.4	92.4	95.4						



Gas Boiler for Heating Digesters and Main Building

Adjustments and Changes:

The original time clocks for automatic operation of the sludge pumps were set for an operating cycle of 15 minutes for 6 times daily, or 4-hour intervals. It was observed that the cycle was too long, due to the fact that the settled sludge in the primary clarifiers would gasify and float to the surface. The sludge pits on the primary clarifiers had a capacity of 60 gallons each, which, with the pumps set at a rate of capacity of 60 gallons per minute, would empty in one minute.

After allowance was made for sloughing of sludge in the pit and clearing of the connecting sludge lines, it was found that one minute and forty seconds was approximately the correct pumping period. The time clocks were rebuilt to give an adjustable length of pumping cycle, and were set to operate both pumps for one minute and forty seconds at half-hour cycles, thus reducing the total daily pumping for each pump from 90 to 80 minutes. This change eliminated the floating sludge in the clarifiers, reduced the total pumpage to the digesters, raised the temperature in the digester, and lessened the supernatant liquor to be returned to the plant.

Improvement was made in the digester operation by equipping the manually-operated stirring device, with automatic operation by clock control, set for a stirring period of five minutes, at 15-minute intervals; staggered between the sludge pump operation cycle. Better settling of digester solids was obtained.

Further improvement in digester results was made by keeping the level of solids in the primary digester below the wash stream of the impeller, a daily transfer of sufficient bottom primary sludge to the secondary to keep clear the transfer of supernatant liquor. The sludge was kept in the secondary digester until the supernatant liquor overflow to the raw sewage well became turbid, which indicated that sludge should be drawn from the secondary digester onto the drying beds. The above operation produced better digested and thicker sludge.

During the period of the plant adjustment the filters developed a "sour" condition. Construction debris of broken tile, concrete and fine gravel had clogged the air vents from the filter block underdrain to the outer air vent chamber. These vents were cleaned out and enlarged for better air circulation, which improved the filter operation and eliminated the stale or sour condition in the filters.

After the aforementioned adjustments and corrections were made, recirculation was then changed from the filter effluent to recirculation from the sludge well of the final clarifier, which resulted in a much clearer final effluent and a greater reduction of B.O.D. in the primary clarifiers.

The time clocks were changed and adjusted in April, and the other adjustments were made at a later date so that in June the improved efficiency in operation became very apparent in the increase in B.O.D. reduction through the plant. The average overall reduction in B.O.D. from January to June was 92 per cent, and from June to December, inclusive, the average B.O.D. reduction was 96 per cent.

History and Finances

The sewer system and sewage treatment plant are operated in connection with the municipally-owned water and light systems of Jonesboro, under the general control of a Board of Directors, with an engineer-manager in direct charge of operations. This arrangement has developed over a period of years.

In the beginning, July 1, 1906, three special improvement districts were formed to take over existing utility systems (electricity and wa-

SCHEDULE "W" WATER

First	2000 Gal. used per month	90.0c net.
Next	10000 Gal used per month	27.0c net per M gallon
Next	40000 Gal. used per month	22.5c net per M gallon
Next	50000 Gal. used per month	18.0c net per M gallon
Next	100000 Gal. used per month	13.5c net per M gallon
Next	100000 Gal. used per month	9.0c net per M gallon

All over 303000 Gal. used per month 8.0c net per M gallon.

Minimum bill for:

5-8" Meter	$0.90 per month net
3-4" Meter	1.50 per month net
1" Meter	2.00 per month net
1¼" Meter	3.00 per month net
1½" Meter	3.50 per month net
2" Meter	5.50 per month net
3" Meter	10.50 per month net
4" Meter	13.50 per month net
6" Meter	30.50 per month net

APPLICATION: General water service. No more than one residence or more than one business house will be served through one meter. Size of meter to be determined by City Water and Light Plant. Services of 2" and larger subject to minimum contract of one year.

Schedule of Water Rates

ter) and to lay a system of sanitary sewer lines. Each district was separate, one for electricity, one for water, and one for sewerage. Each had a board of three members, elected by property owner vote, each director serving a term of three years, and each property owner voting as many votes as dollars of improvement taxes paid by him during the past year.

These three boards met together and operated the three businesses together, with one overhead until they were legally combined by legislative action in 1921. Voting had been previously changed to one vote for each dollar of state, county, and city taxes paid, with three directors elected each year. These have always been policy making boards, leaving the management to a manager employed for that purpose.

Tax benefits to the amount of $263,685.65 were collected over a period covering nine and one-half years when it was determined that earnings of the water and electric system would adequately support the sewerage system in addition to the water and electric systems.

From the start the sanitary sewerage system has been a non-earning operation carried on from water department surplus. The total tax benefits of $263,685.65 has been credited to the sewerage system and all expenses and betterments have been charged against water department earnings.

Therefore, the water and electric departments have received no lasting benefit from the original tax monies, except to help them get started on their way to self-support, the tax money having later been credited to the sewerage department.

The December 31, 1943 book value of the entire sewage plant and system was $386,221.31, which included the sewer system, lines, manholes, etc., $171,844.14; the sewage disposal plant, two lift stations, force and gravity lines to the new plant, $214,377.17.

All this has been quite a load to the water department. Money requirements at times were extremely heavy. But we are proud of the fact that the water department is not in debt to the electric department but has a surplus of $42,734.94, and the entire water, electric, and sewerage system is not only out of debt but has cash balances totaling now over $350,000.00.

And, when it is noted that there is no sewage disposal rate, no sewerage tax, or other costs to our customers other than payment of regular water rates in the accompanying schedule, we feel additional pride in the accomplishment.

Annual sewerage operating costs for 1943 were as follows:

Total operating expenses, entire system and plant	$ 7,160.25
Total maintenance costs	1,702.23
Depreciation	11,928.15
1943 operating cost	$20,790.63

The water department furnishes to the City of Jonesboro free water service, installs and maintains all fire hydrants, and has, since 1940, enjoyed the only Class 1 rating in Arkansas by the National Board of Fire Underwriters.

The water tank illustrated and covered by an article in WATER WORKS AND SEWERAGE, January 1942, and the sewage disposal plant described herein were built during 1940 and 1941 and totally paid for from accumulated earnings. Not a cent was raised by borrowing, raising water rates, or inaugurating a sewerage charge of any kind.

The sewage treatment plant site and grounds are artistically landscaped and seeded with grass and flowers. The cleanliness of the plant and grounds, and the highly satisfactory operating results may be duly credited to the efficient operation and operating personnel.

The pumping equipment and comminuator were furnished by the Chicago Pump Company, and the mechanized equipment for the clarifiers, filter distributors, and digesters were furnished by Dorr Company, Inc. Carrothers and Crouch, Kansas City, Missouri, were the general construction contractors. Burns & McDonnell Engineering Company, Kansas City, Missouri, designed the plant and supervised the construction.

H. P. Jones and Co. Becomes Jones and Henry

Announcement has been received that effective April 1, Thomas B. Henry will be associated with Harvey P. Jones as a partner and the engineering practice formerly carried on under the name of H. P. Jones and Co. will be continued by the new firm of Jones and Henry, at the same location in Toledo.

Mr. Jones, was a 1916 graduate in Civil Engineering from the University of Michigan. His experience includes water works and sewerage for the city of Toledo, association with the firm of Fuller and McClintock, and many projects in the midwest under his own name.

Mr. Henry is a graduate of the University of Pennsylvania receiving a degree in Civil Engineering in Hydraulic and Sanitary Engineering in 1919. His experience includes a number of years with the city of West Palm Beach, Florida, as engineer and City Engineer. Since 1927 he has been associated with Mr. Jones working on reports, designs, and supervision of construction on many sanitary engineering projects.

Harvey P. Jones

Thomas B. Henry

500% AWWA Member Increase is Arkansas Record

That Arkansas' increase of more than 500 per cent in membership in the American Water Works Association constitutes a record for the country was the statement made by AWWA's President-elect S. F. Newkirk, Jr., attending the 14th Annual Arkansas Water and Sewage Conference at the Marion Hotel in Little Rock, April 17-18.

In spite of war restrictions an attendance of 138 was the largest in the history of the Arkansas Conference, which enjoyed an unusually strong program developed principally through the efforts of Professor W. R. Spencer of the Department of Civil Engineering, University of Arkansas as Chairman of the Executive Committee.

The following officers were elected: Chairman, Edgar T. Brown, Supt. of Water, Fayetteville; Vice-Chairman, M. C. Turner, Supt. of Water, Conway; Secretary, Harrison Hale, Department of Chemical Engineering, University of Arkansas, Fayetteville. Executive Committee: Chairman, W. R. Spencer, University of Arkansas; H. C. Ward, Supt., Siloam Springs; Bernard Allen, Supt., Blytheville; M. D. Mouser, Supt., Stamps; Solon Sanderson, Supt., Marianna; J. R. Pierce, Manager, Arkansas Water Co., Pine Bluff; Jay Medlen, Water Department, Fort Smith.

INDIANA SECTION'S 37TH MEETING WELL ATTENDED

Flood Symposium Timely

"IN SPITE of Hell and High Water," well at least in spite of high water for it so happened that the high water came at the same time as the 37th annual meeting of the Indiana Section in Indianapolis on April 13-14. But the floods which were threatening at several spots did not keep down the attendance at the meeting. Contrary to the situation in Illinois the same week where the attendance was less than half the membership, the Hoosiers had more men at their meeting than there are members in the section.

Chairmen

Incoming	Outgoing
Clarence Adams Water Plant Supt. New Albany, Ind.	*H. W. Niemeyer Supt. Distrib. Ind. Water Co. Indianapolis*

With a membership of only 179, the attendance was 220 of whom only 38 were manufacturers' representatives and about a dozen guests. Even if membership aspirants (some twenty-five at the time) are counted in, the attendance was still more than the membership, which is quite a contrast to that in the neighbor section to the west.

Business Meeting

As indicated above, at the Friday luncheon E. F. Kinney, Chairman of the Membership committee reported an increase in the section membership, with approximately twenty-five additional applications waiting approval of the AWWA directors.

Election of officers was by unanimous ballot cast for the following:

Chairman — Clarence D. Adams, Supt. of Water, New Albany, Ind.

Vice Chairman—Joseph E. Quinn, Act. Ch. Engr., Indiana Dept. of Health, Indianapolis, Ind.

Secy.-Treas.—Charles E. Bechert, Engineer, State Dept. of Conservation, Indianapolis, Ind.

Asst. Secy.—Thomas Burrin, Supt. of Water, Lebanon, Ind.

Fuller Award

At the annual banquet the George W. Fuller Award was announced with the following citation: "This year your committee has selected a man who has been active in the Section for a number of years, serving on many committees with distinction; a man who is a past chairman and has endeared himself to a great many of us who have called on him in time of calamity. For outstanding loyalty to the section and the association, for continuous effort in membership building, for unselfish participation in short schools and district meetings, and especially for service far beyond that expected of him in time of disaster, the committee has selected Edward Francis Kinney as Fuller Awardee for 1944."

Fuller Award

Ed F. Kinney Dist. Mgr. Wallace & Tiernan Indianapolis

Vice Chairman

Joe E. Quinn Act. Chief Engr. State Dept. Health Indianapolis

The 1943 Floods

When the program committee planned to hold a symposium on the 1943 floods little did they realize that several of the participants picked to tell their experiences would be unable to attend the meeting because of the *1944* floods. In spite of the shortage of participants, listeners to the symposium led by M. H. Schwartz, Manager, Vincennes Water Dept., were alternately enthralled, enchanted, enthused or enlightened by the story of the vagaries of rivers at flood tide.

The choice of M. H. Schwartz to lead the symposium was a happy one and the recounting of his life on the Wabash River left no doubt in the minds of his hearers that rivers have personalities and sometimes, too often, split personalities. Born in a house on the "Banks of the Wabash" some four decades ago and still living in that same house Mr. Schwartz has seen the river of song and story in all its moods from an almost pleasant pastoral stream to a tearing avalanche of water, from a murmuring oversize brook to an angry roaring flood.

"Contrary" is the way Mr. Schwartz described the stream. "Yes, contrary," for when it seemed most in tune with its surroundings and giving forth of its best side it could suddenly become the instrument of torture or misfortune. Rocks and sunken logs lurked beneath its placid bosom to trap the unwary boatman. Sink-holes and treacherous currents swallowed up the venturesome child bent only on enjoying a wade or a swim. Air holes in its glassy winter covering gave no warning to the unsuspecting skater.

Without warning it would bring to the door of Vincennes the refuse and discharge from its sister city of Terre Haute farther up stream. And yet it furnished fish for food and pleasure, ice in the winter, and water to drink. Truly a Dr. Jekyl and Mr. Hyde. But, it was at its worst when, swollen by rains and melting snows, it became a giant unleashed to wreak damage and misery with all its unrestrained fury on the very people who had called it friend.

In four decades Mr. Schwartz has seen the Wabash River in all its moods and vicissitudes. His word picture called many a scene to mind for those of us who likewise had spent a boyhood along a river bank.

Wabash, Ind., has its water plant

Secy.-Treas.

C. E. Bechert State Engr. Dept. Conservation Indianapolis

Asst. Secy.

T. J. Burrin Supt. of Water Lebanon

located on Treaty Creek and is confronted mostly with the back water problem when the Wabash River is high. Mr. F. M. Hartman, Supt. at Wabash, said that from his experience in the 1943 flood it was apparent that planning and preparation

Program Headliners

Samuel A. Morse, Pres., AWWA, Stanford Univ., Palo Alto, Cal.
L. R. Howson, Past Pres., AWWA, Cons. Engr., Chicago, Ill.
H. S. Morse, Gen. Mgr., Indianapolis Water Co.

for floods was important; so too is available man-power, adequate supervision, and cooperation of the local municipality.

Glen Garman, Supt. at Lafayette, made use of an emergency well when his plant was flooded out. With a storage capacity of 6 mgd. and the emergency well capacity of one mgd. it was obvious that the normal demand of two mgd. could be met for six days if it was necessary to keep the water plant down that long. Mr. Garman sought the cooperation of the consumers. He asked through the newspapers and other channels that the inhabitants conserve water in order to make the supply last even longer. The townspeople co-operated not 100 per cent—but 200 per cent. They, in fact, drew tubs full of water, filled buckets, cans, dish-pans, everything that would hold water.

Information Please

(Niemeyer, Bechert, Kinney, Howland, Laux, Shoemaker, Schaeffer, Gunderson, Matthews, Bready)

And then to check on the water supply, the good people frequently dumped the containers and filled them up again—just to make sure the water they were conserving was fresh. Result—the daily consumption went up to three mgd. and the town was out of water on the third day. Result—Mr. Garman will not ask his consumers to cooperate again.

The Delphi Water plant like that at Wabash is not on the Wabash River but is on a small creek. Even so a dike or levee has been constructed about the plant, and heretofore that had been sufficient, but in 1943 a local rain of 2.53-in., while the Wabash was in flood, caused a rise in the creek of 10 feet. That was two feet over the levee and the town was out of water for two days. Mr. C. A. Robbins, the manager of the Water Works, reported that during that period every time he rubbed his sleepy eyes, two State Dept. of Health men sprang up at his side much like the Genii of Aladdin's Lamp. Mr. Robbins found them to be very helpful Genii.

Inasmuch as the whole supply including the distribution system had been contaminated, it was necessary to do some main sterilization. Chlorine was added from a portable chlorinator to the mains to produce a residual of 100 ppm. "This," according to Mr. Robbins, "burned out the mains—It also burned up the consumers." The consumers were advised to boil all water and this added "precaution" removed enough of the chlorine to make the water drinkable although not potable in the strictest sense of the word.

Mr. Leo Louis of the State Dept. of Health was one of those "two men who popped up at the side of overworked superintendents" during those flood days of 1943. Mr. Louis recounted the experience of West Terre Haute where the water supply was out of service for two days. There too, the citizens used up the reserve too fast, some actually opening the faucet to see if the "water had quit running yet." By overchlorinating an interconnection through a fire hydrant on the Terre Haute system it was possible to get some water to the thirsty people across the river.

In one locality it was reported that surface water contamination of a well supply had caused 600 cases of intestinal infection. Mr. Niemeyer pointed out that planned protection of one sort or another was important to controlling flood conditions. Important too, and fully demonstrated in its effectiveness, was the mutual aid system which sprang into being with the advent of war. There is one outgrowth of the war that should never be lost for it is as helpful in peacetime disaster as it would be in any war-wrought damage.

Depreciation—Fact or Theory

"When a program chairman wants a good committee report, send for L. R. Howson," must be the slogan of the AWWA sections. From the Illinois Section to the Indiana Section in 24 hours with two different com-

Photo by John E. Klienhenz, Indianapolis Water Co.

The F. C. Jordan Gavel

(Wm. C. Mabee, retired chief engineer of Indianapolis Water Co., makes presentation for Mrs. F. C. Jordan of the gavel used by Mr. Jordan, deceased, during his presidency of AWWA in 1925. Howard Niemeyer, section chairman, receives the gavel.)

mittee reports seemed to be a mere step for Mr. Howson, who left the Indiana meeting on his way to work on another committee report for ASCE.

At Indianapolis, Mr. Howson, a past president of AWWA, said he was presenting his own views on the subject of depreciation of water utilities, but we strongly suspect that his committee will find his ideas so good that they will accept them in toto.

The committee of which Mr. Howson is Chairman was formed to review the report issued by the Depreciation Committee of the National

Programmers

A. E. Griffin
Tech. Serv. Dept.
Wallace & Tiernan
Newark, N. J.

Don E. Bloodgood
Prof. Civ. Engr.
Purdue Univ.
Lafayette

Association of Railroad Utility Commissioners, on the matter of utility depreciation. Mr. Howson's committee is reviewing that report to determine in regard to water utilities wherein AWWA agrees with or dif-

Information Please Experts

Paul Laux, Supt. of Water, Anderson

W. E. Howland, Prof. Civ. Engr., Purdue Univ., Lafayette

N. E. Gunderson, Pres., Layne-Northern Co., Mishawaka

L. R. Mathews, Supt., Water Wks. and Sewerage, Fort Wayne

Ira J. Bready, The Permutit Co., Cincinnati, Ohio

Edward F. Kinney, Wallace & Tiernan Co., Indianapolis

fers with the findings of that report. [Ed. Note: AWWA's Executive Committee has just reviewed and approved the Committee's objections and such have been filed with NARUC.]

The NARUC report defines depreciation somewhat differently than the legal definition annunciated by forfer Chief Justice Hughes as "the loss in value not restored by current maintenance." The difference in the two definitions is apparently but a few words but the difference in meaning is quite important.

Mr. Howson points out that when a water plant begins to operate it immediately begins to depreciate and no amount of current maintenance will prevent the coming of the day when its parts will have to be replaced. This depreciation or replacement must be refinanced and utilities should set aside an amount of funds each year to allow for such replacement due to depreciation.

The NARUC Report provides for a straight line depreciation; that is to say, the length of life is arbitrarily set and a definite percentage

More Experts

Chas. E. Bechert, State Engr., Dept. of Conserv., Indianapolis

Leo Louis, San. Engr., State Bd. Health, Indianapolis

Wm. C. Shoemaker, Mgr., Water Works, Richmond

of that amount is set aside each year. This allows the accumulation of considerable surplus over the years and the temptation to transfer the funds to other purposes.

Mr. Howson says it is impossible to set a life on water works property, as for example cast iron mains, the ultimate life of which has not yet been determined. Therefore one can not say for any particular system without an actual appraisal of local conditions that the depreciation is so many per cent annually for so many years. Mr. Howson contends that the annual allowance for depreciation and the accrued depreciation should be in harmony but from considerable experience he does not agree that both follow the same "straight line," as proposed by the NARUC Report.

Further comments by Mr. Howson included these: The annual depreciation allowance should finance the actual depreciation, but the actual depreciation is independent of how it is financed, and the annual depreciation allowance should be determined by the actual depreciation.—It is impossible to project the ultimate life of water works equipment and to estimate the salvage value at a distant future date, as would be necessary according to the NARUC system of straight line depreciation.—Water works utility men can estimate actual depreciation better than they can predict future life and salvage value.

Valuation studies made every five or ten years will serve to keep the reserve in step with the annual allowance and both in step with the actual depreciation.—The NARUC report assumes facts which have as their basis only theory, but it should be the other way around.—The NARUC report further recommends that if the accrued surplus is less than the straight line depreciated value, the utility should withdraw the difference from other surpluses, and this accrued depreciation surplus should be of the order of 25 to 40 per cent not 13 per cent as many utilities operate under.

Mr. Howson believes this recommendation transfers the cost of depreciation from the consumer who should pay for depreciation as a part of service to the utility which has been unable to accrue it. Mr. Howson concluded with a statement that state commission regulation of municipal utilities as in Wisconsin (see report on Ill. Sect. meeting elsewhere in this issue) is a desirable condition which will bring about uniformity in such practices as estimating depreciation and providing for it.

AWWA Service to the Industry

Samuel B. Morris, Pres. of AWWA, who like Messrs. Howson, Filby, a number of "Peddlers" and yours truly, "Doc" Symons, had hopped from Peoria to Indianapolis to catch meetings of both sections, told the luncheon audience of "AWWA Wartime Service to the Water Works Industry." In doing so, Dean Morris reviewed the work of Secretary Harry E. Jordan as "Water Works Man of the Year," on the matter of priorities and other problems. Dean Morris expects Mutual Aid to continue, and spoke enthusiastically of the work of the Com-

And Then Came the Floods!

M. H. Schwartz, Supt. & Gen. Mgr. Water Dept., Vincennes

Glen Garman, Supt. of Water, Lafayette

W. H. Durbin, Mgr. Water Dept., Terre Haute

mittee on Water Works and Sewerage Works Development and it's Mr. Filby who has carried the idea of *Blueprint Now* to nearly every state in the Union.

Candid Camera

C. K. Calvert Supt., Indianapolis Water Co.

Howard Niemeyer Opens Session

Mrs. Paul (Bee Gee) Frame Ulrich Chem. Co. Indianapolis

Winifred Fisk Secy. to Mrs. Frame

Don Bloodgood talks on viruses

"Woo Woo," the bango player, told jokes too!

President Morris also spoke on the standards of practice, on the review of the Standard for Drinking Water which the Association had requested the USPHS to undertake, and on the efforts of the Association to stamp out the elevated tank repair racket.

Mr. M. H. Schwartz, AWWA Director from Indiana, reviewed the work of the Directors meeting of last January. Secretary Harry Johnson, being "back home again in Indiana" was called on for some comments at the annual luncheon following the other speakers. Mr. Jordan also mentioned the drinking water standards, and pointed out that AWWA had not acted as an emissary from Washington to individuals as had at one time been desired by Washington. AWWA had on the other hand been helpful in the organizing of OWU which was the best organized "bureau or commission" in the Capitol city. AWWA through its work with the Bureau of the Budget helped to liquidate a number of questionnaires, which, had they seen the light of day would have consumed many more man hours in answering, without serving any useful purpose.

Mr. Jordan also said that, as far as the man-power situation is concerned, it is unlikely that key men will be drafted from water works; but if a utility has a man under thirty-eight not in a key position it had better be prepared to let him go.

Depreciation of Water Quality in Distribution Systems—Again!

Under the title of "Control of Taste, Redwater, and Bacterial Aftergrowth in the Distribution System," A. E. Griffin, Tech. Service Dept. of Wallace and Tiernan, in Newark, N. J., talked on the same fundamental problem discussed by John R. Baylis at the Illinois Sect. meeting in Peoria (see report elsewhere in this issue) and the same problem about which Marsden Smith wrote in WATER WORKS AND SEWERAGE in the March issue, namely that of the depreciation of water quality in the distribution system.

M. H. Schwartz Vincennes Water Co.

Mr. Griffin believes that tastes and odors and red water, are caused by after-growths of gas former bacteria, whether coliform or not, in the sludges in mains and dead ends. In other words, these bacteria which do not confirm and are therefore

Hosts

H. S. Morse Vice-Pres. & Mgr. Indianapolis Water Co. (Presided over post-war planning)

Wm. C. Mabee Chief Engineer Indianapolis Water Co. (Retired April 1 after 42 years)

usually of little significance in the water as it leaves the plant are the causes of most of these troubles. These organisms grow in the distribution system, utilizing for food the natural ammonia, together with other organic matter present, either in the water or in the sludge that has accumulated from minute amounts of turbidity and organic colloids that have passed into the system over a period of years and there precipitate or "plate out" on main interiors.

Experimental data at two different plants showed that the use of break-point chlorination eliminated these gas formers, both confirming and non-confirming, and at the same time reduced the taste and odor problem. The explanation of the advantage of break-point chlorination lies in the fact that it first removes all the natural ammonia which serves as food for the bacteria and it also allows the existence of free "active" chlorine, not chloramine, and that such "free" or oxidative chlorine is more germicidal than chloramine to these organisms.

The control of break-point chlorination has become simplified through additional studies reported in Mr. Griffin's paper. It has been found that the difference between chloramine and free chlorine can easily be determined by the ortho-tolidine test. Any yellow color produced immediately on the addition of the water sample to ortho-tolidine solution (i. e., the flash test) is indicative of "free" (oxidative) chlorine. The maximum color produced within the first 5 minutes is the sum of the "free" chlorine and the chloramine chlorine when the procedure followed is that prescribed in Standard Methods of Water Analysis.

It has further been demonstrated

Also Attending

L. I. Couch Con. Engr. Indianapolis

F. P. MacDonald Electro Rust Proofing Corp.

Wm. F. Hiatt Reg. Engr. U. S. Weather Bureau, Chicago

Don M. Corbett Dist. Engr. U. S. Geol. Survey Indianapolis

E. H. Schlie C. & O. Ry., Peru

L. S. Finch New Chf. Engr. Indpls. Water Co.

that if the free chlorine or flash reading is 85 per cent or more of the total color reading, then break-point chlorination has been established. Thus the flash test and the recording of the maximum ortho-tolidine color reading up to the 5-minute contact limit becomes a simple means of controlling chlorination and consequently depreciation of water quality in distribution systems.

Power for War

Mr. L. B. Schiez, Vice Pres. of the Public Service Co. of Indiana, showed by means of a map, the interconnections of the various power stations in the Indiana territory. It is possible for dispatchers to control the flow of power from any one point to any other point where the load is heavy and additional power is needed. At the present time this vast coordinated network is being used to good advantage for war industry, but it also is of benefit to the water utilities that depend on power for operation of pumping equipment.

Typhoid Fever in Indiana

Typhoid fever is still an ever present menace according to Dr. Thurman B. Rice, State Health Commissioner, who told of a recent epidemic involving 250 cases and 13 deaths in Indiana. The source of the epidemic was not a water supply but Dr. Rice pointed out the fact that if a food borne (in this case cheese) epidemic of such proportions could break out, it made it mandatory on water works men to protect water supplies to prevent the infection from spreading to the water supplies.

Dr. Rice says that eternal vigilance is the price we must pay to be free from typhoid fever, and this outbreak should be a lesson that under pressure accidents will happen and that such an accident might loosen the checks on epidemic disease, thereby allowing it to become rampant once more.

Licenses for Water Works Operators

Prof. P. S. Sikes, head of the Department of Governmental Research at Indiana University, asked the question, "Why License Water Works Operators?" and answered the question in this way. "Certainly not as a revenue producing scheme, nor wholly for the purpose of regulation, but to improve the standard of personnel." This latter purpose has the same goal as civil service, but civil service of state-wide nature is not easily applicable to municipal employees.

Prof. Sikes does not believe that politics and bacteria will mix and he proposes licensing of operators to insure tenure of qualified personnel in municipal water plants in spite of political changes. The state licensing law was defeated in Indiana at the last legislative session. Interest evidenced in Prof. Sikes' talk shows that the legislature may have killed the bill but they did not kill the desires of water works operators in Indiana to see Operator Licensing established on a legalized basis.

Two New Water Supts.

O. A. Newquist, Muncie, and Wilmer Wilson, Marion

Stream Pollution

Joseph E. Quinn, Acting Chief Engineer of the Indiana State Board of Health, and Executive Secretary of the new Indiana Stream Pollution Control Board reviewed the history of stream pollution control in the state. Early attempts to prevent industrial pollution were not successful and a law was actually passed which gave industry a permit to pollute the streams if it had been discharging any waste prior to that time. This was in effect until quite recently. A 1927 law did not adequately cover the situation, and a 1935 law was declared null and void in 1941. In 1943, however, a stream pollution law was passed, creating a control board of six members who are to define pollution and take steps to eradicate it from public water supplies.

The state has been divided into twelve drainage basins and locations of polluting wastes have been recorded. Steps will follow to remove these sources of pollution by treatment.

Annual Dinner

A highlight of the Indiana Section meeting was the presentation to the section of the gavel used by Frank C. Jordan (deceased) during his term as president of AWWA in 1925. Mr. Jordan had served as secretary and chairman of the section, had been active for many years, and had received the Fuller Award and the Diven Medal. The presentation on behalf of Mrs. Frank Jordan was made by Wm. C. Mabee, Chief Engineer (retired, April 1) of the Indianapolis Water Co. of which Mr. Jordan was Secy. at the time of his death. The gavel was accepted for the section by Chairman Howard W. Niemeyer.

In addition to the announcement of the Fuller Award for 1944 the after dinner entertainment consisted of a comic-singer, and talks on the Red Cross in War by Henry Jordan, Pres. of the Federal Chemical Co., and on the Alaskan Highway by Gordon Miller, Pres. of the Miller Construction Co., which built the telephone lines.

WPB and Wartime Maintenance

Mr. F. W. Weed, Regional Engineer, WPB, reviewed the U-1 orders, asked for continued co-operation, explained Form 2774, and said that future shortages would depend on how the invasion goes.

Mr. Weed also told about the method of recharging ground water aquifers at Louisville, where the demand for cooling water was so great that the supply was being exhausted. Cold water is being pumped into the ground during the winter for use during the warm months. This scheme is the same as that proposed in the Peoria, Ill., area.

Viruses

Prof. Don. E. Bloodgood, of Purdue University, reviewed for his audience some of the characteristics of viruses, their size, action, and activity. Viruses like some bacteria may be transmitted by carriers, who become immune to the disease after having had it. Prof. Bloodgood said there are six types of viruses which are represented by these diseases, yellow fever, typhus, mumps, smallpox, poliomyelitis, and measles.

Interest of water works and sewage operators in the virus has been occasioned by the finding of the virus of poliomyelitis (infantile paralysis), in sewage. Prof. Bloodgood said that in the latter case definite cause and effect had not been proved in the case of sewage contamination of water but the problem was deserving of continued study. Experimental work indicates that certain types of sewage treatment are effective in destroying the polio virus, and chlorine in amounts of 1-1.5 ppm. will kill the virus while 0.5 ppm. will not.

Prof. Bloodgood closed with the comment that, "No statement made should be interpreted to mean that

methods now in use are ineffective in protecting the consumer from virus diseases. The review has merely shown the evasiveness of viruses and the need to watch them in the future."

Information Please

In true "Information Please" style, with Howard Niemeyer acting as quiz-master, a board of experts undertook to answer questions that had been presented via card.

F. A. Schaeffer of the Public Service Co. in New Albany, Ind., said that the total cost of mechanical joint pipe was about the same as bell joint pipe because the laying costs were less although the pipe itself cost more.

Ira J. Bready of the Permutit Co. stated that it was not generally good practice to chlorinate ahead of zeolite softeners, each zeolite having a limit. He suggested post chlorination. [Ed. Note: On the other hand, we have known of instances where prechlorination improved zeolite bed efficiencies, due to control of filamentous growths on the zeolite grains.]

The elevated tank racket and means of combating it were explained by several persons in the audience. A. E. Griffin answered the question as to what happens to bacteria when chlorinated and explained that the dead bacteria were unimportant to bodily health.

Harry Jordan gave a resume of the relation of fluorides in water to mottled teeth and dental caries, and told about the experiments which are to be conducted in New York State on the use of fluorides in water for mass medication. [Ed. Note: More recently, Brantford, Ontario, has decided to treat the entire public supply with fluoride as a dental caries control measure.]

Clinic on Post War Planning

Following lunch on Friday, H. S. Morse, Vice Pres. and Gen. Mgr. of the Indianapolis Water Co., conducted a clinic on post war planning. First speaker was E. L. Filby, who explained the workings of *Blueprint Now*, the reasons therefore, and the action by which communities should put it into practice.

Raymond Pike, Director, of the Indiana Economic Council, spoke on Indiana's plans to date mentioning that out of 1895 governmental units in the state, 847 had compiled lists of projects totalling 900 different proposals. Of these 37 per cent are planned and ready for contract, 33 per cent are under plan and the rest are still being talked about.

In the list are 60 sewer systems, 45 sewage plants, 37 water plants including seven softeners, and 54 distribution systems. According to Mr. Pike the reconversion period has started and Indiana will need half a million more jobs after the war than in 1940. "The time for planning is past and the time for designing is here," were Mr. Pike's closing words.

George H. Kuhn, Chairman of the Indianapolis Post War Planning Committee said that Indianapolis had not yet contributed its plans to Mr. Pike's Committee, but he outlined a comprehensive program for Indianapolis.

The meeting closed with a motion picture in color of the "Construction of the New Indianapolis Impounding Reservoir" with a talk by Wm. C. Mabee, retired Chief Engineer, and running comments with the picture given by Claris Allen, Asst. Engineer.—(G.E.S.)

"Bill" Mabee Retires After 42 Years with Indianapolis Water Co.

William C. Mabee, Chief Engineer of the Indianapolis Water Company, retired on April 1st after forty-two years of active service.

Mr. Mabee started work with the utility on June 10, 1902, and rose to the position of chief engineer by 1928.

Among the many plant additions during his more than four decades of employment were the recently completed impounding reservoir on Fall Creek, the Fall Creek purification plant, the expansion of Riverside and Fall Creek pumping stations, two 1½-million gallon elevated tanks, and the addition of rapid sand filters to the White River plant, as well as several underground storage reservoirs.

In 1938 Mr. Mabee was awarded the John M. Diven Medal of the American Water Works Association for his work on developing specifications for the laying of cast iron water mains, and in the same year the Indiana section presented him with the George W. Fuller Memorial Award.

When Mr. Mabee joined the company in 1902, Indianapolis had a population of 185,000 and the water supply contained 227 miles of water mains, 1840 fire hydrants, about 14,000 services, and a pumping capacity of 50,000,000 gallons daily. The average daily consumption was approximately sixteeen million gallons.

Today the population served by the Indianapolis Water Co. exceeds 415,000, which includes some suburban area. The distribution system consists of 729 miles of pipe, 6516 fire hydrants, and more than 87,000 services. The pumping capacity is 215,500,000 gallons daily and in 1943 the average daily pumpage was forty-five million gallons.

Finch Becomes Ind. Water Co. Chief Engineer

Lewis S. Finch, principal assistant engineer, of the Indianapolis Water Co., was named as chief engineer to succeed William C. Mabee who retired April 1 after forty-two years of service.

Mr. Finch became associated with the water company on February 2, 1942, in the capacity of principal assistant engineer. Prior to that time he had been engaged in private practice as consulting engineer specializing in municipal water works and sewerage problems.

Graduated from Purdue University in 1921, Mr. Finch worked on various engineering projects until 1925 when he became chief engineer of the Indiana State Board of Health. In

L. S. Finch

1933, he went into private engineering practice with Dan Babcock, continuing alone after Mr. Babcock's retirement from the firm in 1936.

Mr. Finch is a member of ASCE, AWWA, and FSWA. He was chairman of the Indiana Section AWWA in 1932, president of the Central States Sewage Works Association in 1930 and of the Indiana Engineering Society in 1933.

MAINTENANCE OF PUMPS*

By HARRY STOCK
Engineer
Minneapolis Water Department
MINNEAPOLIS, MINN.

THE three major pumping stations of the Minneapolis Water Works Department consist of eighteen large centrifugal motor-driven pumping units, ranging in capacity from 20 to 50 mgd., and a number of miscellaneous units such as small centrifugal pumps, plunger type of sludge pumps and steam-driven boiler return feed-water pumps. The need for emergency repairs is reduced to a minimum during the season of peak demand, since the pumps are inspected each fall and winter and those units which show signs of giving trouble, if continued in operation for another season, are taken down and repaired. The inspection covers the following parts: packing, bearings, couplings, sleeves, impellers, labyrinth rings, body of pump and alignment and setting of pump.

Packing

The packing of a pump should be soft and pliable and still be tough enough to withstand strain without washing out. The rings of packing should be carefully cut and the gland so adjusted that the packing is tight enough to permit a slight leaking of the cooling water. In tightening a gland care should be taken to bring up the bolts uniformly so that the packing will be subjected to the same pressure throughout.

Bearings

No part of a pump unit requires more attention and repair than the bearings. In general, they can be divided into two types — the sleeve bearing and the ball or roller bearing.

Sleeve bearings are more commonly used in large units, perhaps because they function satisfactorily as long as they have enough oil, even though they are badly worn. In rebabbitting a bearing it is important to have the oil channeling correct. In a well-fitted bearing there must be a clear oil channel from the point where the oil is brought to the shaft and bearing by the oil ring to the sump. This is especially true of bearings taking end thrust, which, when excessive, will cause heating.

When a bearing wears to a point where it has too much play it is rebabbitted or replaced with a new bearing and fitted to give the proper clearance. One thousandth of an inch per inch of diameter is satisfactory, but it is a good policy to follow the recommendation of the manufacturer.

Plenty of good oil helps to keep the wear at a minimum. The oil should be inspected at the time the pump is gone over and replaced if in bad condition.

Sleeve bearings sometimes become pitted due to stray electric currents which enter the bearing and pass from the babbitt to the shaft. To avoid this the bearing pedestal is insulated, thus preventing the current from grounding.

Ball and roller bearings are conceded to be the most efficient. They are made in a wide range of types, each of which performs a specific duty. The self-aligning bearing is so constructed that any slight misalignment is automatically corrected without causing a strain in the bearing. Two other types are the fixed bearing, which takes a radial load only, and the type designed to take end thrust in addition to radial load.

Where ball or roller bearings are used it is extremely important that the alignment of the entire pumping unit be very accurate. This type of bearing, unless self-aligning, has practically no clearance and any wobble in the shaft causes a strain in the bearing; the result is a broken ball or roller and a badly worn case and shaft. The correct amount of grease is essential to the maintenance of this type of bearing, as too little or too much will cause heating and wear. Ball or roller bearings require but a small amount of oil and care should be taken not to overlubricate.

Couplings

Couplings may be divided into two types—the semi-rigid or flexible and the semi-universal coupling.

As a rule, the semi-rigid coupling is used in connection with sleeve bearings. This coupling derives its flexibility from rubber-cushioned bolts, but aside from this feature it is rigid. It is well adapted to babbitt bearings because of the liberal clearance allowed in the bearing. It is important that the coupling be machined accurately so that when forced on the shaft the concentricity of coupling and shaft varies not more than .003 to .004 in.

The semi-universal type of coupling is customarily used with roller or ball bearings. As stated before, these bearings have practically no clearance and it is difficult to line up a semi-rigid coupling accurately enough so as to not to put too heavy a load on the bearing. By using a coupling which has some universal action this danger is overcome.

In one of the pumps at Minneapolis (a tandem unit equipped with ball bearings) both the inside bearing and the thrust at the end of the shaft of the booster pump became noisy. The pump was dismantled and both bearings were found to be in bad shape. It developed that when the unit was installed by the manufacturer the split in the casing and all machined surfaces were assumed to be true and the alignment was made from these surfaces. They were just enough out of line, however, to put a heavy lateral load on the ball bearings, and as a result the shaft turned in the bearing instead of the bearing in the race, and the shaft became badly worn at both bearings.

The end of the shaft which entered the end thrust bearing was so worn down that it developed a shoulder on the shaft but, as it was only the last inch or so, it was built up by arc welding and then ground to size. In repairing the inside bearing, however, it was feared that arc welding would warp the shaft, so the shaft was built up by means of metallizing and then turned down on the lathe by grinding. This pump is now operating smoothly.

Sleeves

A bronze sleeve, the ends of which are so machined that they form a watertight seal, slips over the shaft of a pump and serves to confine the water to the impeller and prevents the shaft from making contact with the water.

Where packing occurs sleeves eventually become so badly grooved that it is impossible to adjust the packing properly and the sleeve must either be replaced or built up by metallizing and then turned down to size.

Impellers

Impellers, except for small sizes, are made of bronze and are either the

*A paper read before the Minnesota Section of A.W.W.A., and here reproduced by authorization of the Association.

"open" or "closed" type. In general, the closed type is used for fresh water. After a certain amount of service, impellers have a tendency to work loose on the shaft, thus causing a leak in the sleeve. New keys will sometimes remedy this situation but very often the impeller must be rebored, in which case the shaft has to be built up, preferably by metallizing, and turned down to fit the new bearing.

Impellers sometimes develop cracks due to vibration or to strains set up in the impeller when it is cast. Small pits can be arc welded quite successfully, but as yet no satisfactory method has been devised to mend a crack. An attempt has been made to preheat and weld the impeller but the melting point of the present-day welding material is so high that to heat the impeller to this temperature usually takes the life out of the metal and sets up such excessive strèsses that the impeller cracks again. When an impeller becomes too badly pitted or cracked it should be replaced with a new one.

Labyrinth Rings

Labyrinth rings confine the water to the impeller and raise the efficiency of the pump. They will wear in time and in some cases come loose and batter the threads on the impeller. When this occurs new threads have to be cut and a new ring made to match.

Body of Pump

The body of a pump may sometimes become pitted due to the fact that the material is not absolutely uniform in texture, but these pits are not difficult to repair. The holes can be chipped in such a way that when filled with iron cement, the cement will hold and give a satisfactory surface or the pits can be built up by metallizing and then ground smooth.

Pump Alignment

Pumps may become misaligned due to actual shifting on the foundation and, when this occurs, it is necessary to shim up the pump on its base until the pump and motor shaft are again in true alignment. Sometimes both motor and pump, including the motor stator which may have to be raised or lowered, must be reshimmed.

Quite often a motor bearing persists in running hot, despite the fact that the bearing is perfect. In such cases it has been discovered that in finding its magnetic center, the rotor of the motor shifts, and unless the motor is set to allow for this shift, the collar on the shaft rubs the bearing and causes it to heat. This condition is remedied by moving the motor slightly on its base. This requires new alignment dowels and the old holes should be reamed out and new dowels installed.

One of the high service pumps at Minneapolis is supplied on the suction side from the Columbia Heights Filtration Plant by a gravity head of about 185 ft. and acts as a booster pump to raise the head in the system to about 250 ft. Whenever the suction head came onto this pump the pump actually moved upward and to the south. Each winter the pump had to be moved north and realigned. The trouble was traced to the faulty foundation on which the manufacturer set the pump and also the inadequate base plate used. In addition, the piping to the pump was of such character that any movement in the piping due to pressure or temperature change reached the pump and actually moved it. The pump was removed to substantial foundations and a heavy concrete base plate constructed. The expansion joints in the pipelines were shifted so as to prevent all pipe movement from being transferred to the unit. This incident illustrates the importance of setting and aligning a unit accurately.

Miscellaneous

The repair of small centrifugal units is similar to those of the large units but the plunger type of sludge pump requires special attention. When a plunger wears to the point where it needs repairs, it is turned down and then by metallizing built up with a harder material (high chrome stainless steel) and then ground down to size. This is working satisfactorily at Minneapolis and it is hoped that the life of the plunger will be prolonged by this treatment.

In maintaining a number of pumping units it is advisable to adopt a definite scheme of inspection which will enable the maintenance crew to detect troubles before they become serious and thus avoid major repairs.

Burning Water*

In over sixty years' experience, the writer has burned coal in practically every kind of furnace, and has developed a number of ideas on combustion; some orthodox, some not. One idea in particular is facetiously known as "burning water".

The plant, of which the writer has charge, is only 30 miles from the State University, and many times the Senior Engineering Class has visited the plant, for observation and study.

One professor brought his class for study from the operating standpoint. It looks very easy when one sees a trained fireman keeping the steam gage hand on the dot, so it was agreed that two students would do the firing, as there were two boilers in operation. Two would watch and regulate the feed water (temperature, hot well, and make-up water).

To give them a square deal, the regular firemen cleaned the fires, and loaded 2 charging cars of coal. With 1½ gages of water and steam pressure normal, at 150 lbs., the students took over at 1:00 P.M. All went well for about 30 minutes. Then the steam began to lag. From that time on, the pointer "had the weight on the wrong end", and it would not stay up, just kept going down. I suggested that they moisten the coal, a soft Illinois coal, mostly fines, and known as slack, but they just smiled. However, when the steam dropped to 70 lbs., it was up to the firemen to take over, and the students were very glad to let go. I told one fireman to take the fires, but first to wet his coal. The professor said, "You are one of those fellows who burns water, aren't you?", to which I replied, "I'll let you answer that question". In 25 minutes the steam was normal, without touching the fire with poker or clinker hook.

Now for what happens to the fire bed. The moisture from the coal is given off as steam. This steam passes up through the fuel bed, and prevents the surface from coking. The fuel bed catches fire, throughout. To have a good fire, air must pass through the fuel bed. Coking of the slack prevents insufficient draft. The professor said, "It looks as though there is something to it," but he didn't look convinced.

At another power plant, where there were 10 B. & W. boilers with B. & W. chain gates, I put sprays over the coal hopper to moisten the coal. Within three months, four other plants of this company were using the system in spite of the first reaction of the Mechanical Engineer that the idea was crazy. But "burning water" with screenings or slack coal is not crazy—it works!

*Contributed by Martin M. Symons, (Late) Chief Engineer, Interstate Water Co., Danville, Ill.

ILLINOIS SECTION HAS VARIED PROGRAM AT PEORIA

IN spite of a varied program running from corrosion of well pumps to water softening, the attendance at the Illinois Section's 36th annual meeting was not encouraging.

Chairmen

Incoming	Outgoing
Herbert L. White *Sanitary Engr.* *Univ. of Ill.* *Urbana, Ill.*	*Clifford Fore* *Chief Operator* *Munc. Water Wks.* *Carbondale, Ill.*

Out of a membership of nearly 300, only 126 attended, and of these 40 were manufacturers' representatives and 15 were guests.

For those who did attend there were four technical sessions, the business meeting, and the banquet preceded by a good fellowship hour and entertainment furnished by the manufacturers.

Business Meeting:

New officers for the section were chosen as follows:

Chairman, Herbert L. White, Sanitary Engineer, Univ. of Illinois.

Vice Chairman—Capt. C. W. Klassen, Sanitary Corps, U. S. Army.

Trustee—Horace Frye, Asst. Supt. of Water, Evanston.

Secretary—O. T. Birkness, Dist. Mgr., Wallace and Tiernan Co., Chicago.

Considerable interest and discussion centered on the subject of Employes' Retirement Systems for municipal employes. Mr. W. R. Gelston discussed briefly the system in use at Quincy.

Laboratory Control for Water Supplies

Under the title of "Better Laboratory Control of Public Water Supplies," E. S. Clark, Bacteriologist of the State Department of Health, reviewed the changes in chemical and bacteriological tests in the past several years.

Among other things, Mr. Clark proposed fuller use of laboratory facilities in all water works and limiting turbidity to two ppm. Pointing out that although the ortho-tolidine test had been improved, it still could not be depended on entirely as a measure of disinfection and tests for coliform bacteria must be continued.

Mr. Clark discussed some of the improvements and changes in the ortho-tolidine test, mentioning the use of compensating solutions for turbidity and color interference, the use of the dihydrochloride salt to make up the reagent solution, the replacement of solutions after six months' use, prevention of freezing, and use of commercial sets of colorimeters.

Where interference occurs from manganese and other substances, Mr. Clark recommends the neutral starch-iodide test although he has found the Hallinan arsenite test to be useful.

In regard to the USPHS standards for bacterial content, Mr. Clark believes that for surface supplies, the number of samples required for small populations is not enough. For example, for a village of 2,500 only one sample per month is required, while a city of twice that size requires only two, and one three times the size requires but five samples.

Fuller Award

Winfred D. Gerber
Engr., State Water Survey
Urbana, Ill.

Vice Chairman

Capt. C. W. Klassen
San. Corps
U. S. Army

In answer to a question concerning results obtained with ten ml. portions versus those obtained with 100 ml. portions, Mr. Clark said, "When five 10-ml. portions of samples are planted along with five 100-ml. portions, a higher incidence of lactose fermenters is indicated by the 10-ml. portions than by the 100-ml. portions; and," he added, "this is more noticeable in border line cases where the sample contains approximately one lactose fermenter per 100 ml."

Mr. Gelston of Quincy indicated that, where coliforms are concerned, he obtained as high an incidence in one size portion as the other and he obtained a reasonably good comparison for lactose fermenters also.

Copper Sulfate and Control of After-growth

The progress report on the use of copper sulfate for the control of bacteriological after-growth was to have been presented by Frank C. Amsbary, Jr., manager of the Illinois Water Service Co. at Urbana-Champaign, but Mr. Amsbary was necessarily absent because of the death of both his father and mother, who had died within a few hours of each other on the previous Sunday. Mr. Amsbary, Sr., was well known to the Illinois Section, having himself been manager of the Illinois Water Service Co. for many years before his son.

Corrosion of Well Pumps

Dr. T. E. Larson, Chemist, and J. B. Millis, Asst. Engr. of the Illinois State Water Survey, have made a study of the problem of corrosion of pumping equipment in the State of Illinois. The following generalizations were made from their study. Corrosion of pumping equipment appears more marked in areas of high mineral content waters. . . . Nitrates above 10-15 ppm. are corrosive. . . . Chlorides above 150 ppm. appear to be corrosive and sulfates above 200-300 ppm. likewise cause corrosion. . . . One ampere of galvanic current will dissolve approximately 70 cu. in. of iron a year.

When replacements were plotted against mineral content of the various waters it appeared that changes in the water had a bearing on the corrosion. Dissolved air is also a factor. . . . Where a copper air line exists there is usually a galvanic action which causes considerable corrosion. . . Dr. Larson suggested that

Trustee

H. R. Frye
Asst. Supt.
Water Dept.
Evanston, Ill.

Secretary

O. T. Birkness
Dist. Mgr.
Wallace & Tiernan
Chicago, Ill.

attention should be given to installations where there is a close proximity of bronze and iron parts.

The rate of corrosion is dependent on relative size or amounts of the different metals where galvanic action is important. The conductivity of the water and its salt content is also important to the rate of corrosion. As to methods of prevention, Dr. Larson suggests grounding, paint, addition of polyphosphates, and elimination of copper air pipes.

Late Dean of Ill. Operators and Long-Time Friend

Martin Symons
Late Chief Engineer
Water Works
Danville, Ill.

Wm. C. "Bill" Birch
President
Birch Mfg. Co.
Chicago, Ill.

Martin Symons, with 49 years of operating service, died May 2, less than three weeks after his last section meeting.

Mr. R. E. Coughlin, Engineer of Tests, Chicago and North Western Railway Co., said that he had found corrosion where there were chlorides of sodium and magnesium, and sometimes in the presence of sodium sulfate as well as when carbon dioxide is present.

Mr. H. V. Bowlby of the Standard Power Equipment Co. believes galvanic action or stray current the greatest cause of corrosion. When milli-volt measurements are taken on pumps it is found that current sometimes flows one way, sometimes another. Changing bronze impellers to iron was not often a help. The solution to the problem of cavitation is to reduce the peripheral speed of the impeller.

F. P. Macdonald of Electro Rustproofing Co. cited an example of a column pipe where, by the impression of 1.7 millivolts counter current when the machine was running and 0.5 millivolt when shut down, it was possible to completely prevent corrosion. The results of this test covered a 31-month period. At the end of that time there was a film of $CaCO_3$ on the impeller. The method is not satisfactory on the shaft because of the difficulty caused by bearings which act as insulators.

The suggestion was made that where more than one metal was used, thorough bonding of the different metals together followed by grounding aided in the prevention of galvanic corrosion.

Municipal Spiractor Installation

Mr. T. N. Rimbach of the Permutit Co. described the installation of a Spiractor softening unit at Teutopolis, Ill. Pointing out that the Spaulding Precipitator had reduced the softening time from several hours to one hour, Mr. Rimbach said that the development of the Spiractor had reduced the detention time to a matter of 10 minutes. The Teutopolis installation is the first municipal application but it operates on the same principle as other installations, namely, the precipitation of the calcium carbonate on nuclei, the spiral up-flow of the water, high flow rates, and elimination of sludge.

Programmers

J. B. Millis
Asst. Engr.
State Water Surv.
Urbana, Ill.

Ted N. Rimbach
Sales Engr.
The Permutit Co.
St. Louis, Mo.

Dr. T. E. Larson
Chemist
State Water Surv.
Urbana, Ill.

By adding 0.2 lb. of 200 mesh catalyst (limestone) per 1,000 gal. of water treated, and removing 4.8 lbs. of granules per 1,000 gal. of water treated it is possible to keep the volume of catalyst practically constant. Best results with the method are obtained above 50 deg. F., and the water produced has a high stability. It is possible to utilize the system of split treatment with the Spiractor, and with a precipitator in combination it is possible to effectively treat freezing turbid waters.

Program Highlights

Samuel A. Morris
President, AWWA,
Stanford Univ.

E. L. Filby
Field Director
Blueprint Now!

The largest Spiractor installation is at a Marine Base, where three 700 gpm. softeners with open tops are installed. The Spiractor at Teutopolis is a closed type and is followed by a pressure filter. Care and attention required are at a minimum and the water produced has been uniformly good as to softened quality. The small content of iron in the water is also removed in the Spiractor.

Ground Water Levels

As in many states, the lowering of ground water levels in Illinois is of considerable concern. Mr. J. J. Woltmann, Acting Chief of the Illinois State Water Survey, told of the Survey's studies on this problem in three areas in Illinois.

In the Peoria area some 70 mgd. of water are drawn from the glacial drift above the bedrock. Recharge is on an annual basis by percolation from surrounding areas, and so far as can be determined is partly from the Illinois River, although the source of this infiltration has not been located.

"The most consistent feature of the analysis of these ground waters is their inconsistency," and therefore analytical data do not give a clue to what happens to fill this underground storage basin. Low levels

Registration Desk
(Birkness and Registrants)

Program Session

W. P. A. Meeting
(Water Works Peddlers Assn.)

reached in the aquifer are generally the same regardless of the high level or the variation in recharge.

The area around East St. Louis is larger, is 200 ft. deep, and draws

Programmers

E. S. Clark
Bacteriologist
Dept. Pub. Health
Springfield, Ill.

H. Lloyd Nelson
Eastern Mgr.
U. S. Pipe Co.
Philadelphia

from a wider area of percolation, and yet the same phenomenon exists. A study is also being made in the Chicago area. Test wells and continuous observations are the hope for a solution to the problem.

Ground Water Conservation

Mr. L. R. Howson, Cons. Engineer of Chicago and Chairman of the Section's Committee on Ground Water Conservation, presented a report on the subject. Mr. Howson's committee notes a maladjustment in the ground water supply and notes, too, the conversion of several deep well supplies near Chicago to Lake Michigan water supply because of the shortage of ground water, as well as some conversion of industrial wells near St. Louis to Mississippi River water for the same reason.

Mr. Howson told of the experiment performed in Peoria under the direction of Dr. C. S. Boruff, Technical Director of the Hiram Walker Co., wherein water was pumped from the Illinois River to gravel pits in the wintertime to replenish the ground water with cold water. Chlorine was added to the water so pumped and it was found that the chlorine was traceable to a distance of two miles underground. The system was proved to be workable and the committee believes that legislation is needed to allow the creation of a water conservancy district, where necessary, with the power to study the problem and to take steps to improve conditions by the method tried by the Hiram Walker Co. or by other methods if found feasible. Some improvement may be expected after the war but the problem of low ground water levels will not disappear with the coming of peace.

In discussing the problem a representative of the Illinois State Geological Survey said that the cause of maladjustment was poor contruction of wells, wells too close, and leaks from wells to other aquifers. The speaker proposed that other aquifers be developed in glacial sands, limestone or deep sandstone. He does not favor the method of artificial recharge. Others discussing the problem included the State Dept. of Health, who want state-wide control, not conservancy districts.

The morning session was concluded by a splendid talk on "Peoria's Plan for Human Rehabilitation" by Dr. Harold Vonachen, Medical Director of the Caterpillar Tractor Co.

Supervision of Utilities in Wisconsin

In the State of Wisconsin municipal utilities are controlled the same as are private utilities. Mr. P. A.

Presided at Sessions

John P. Harris
Ind. Chem. Sales
Chicago, Ill.
(Trustee)

W. W. De Berard
City Engineer
Chicago, Ill.
(AWWA Director)

Reynolds, Rate Analyst, Wisconsin Public Service Commission, told how it was done and the benefits to be derived from such control.

Municipal utilities are allowed the same per cent return as are the private utilities. Among the many problems studied in its control of these municipal utilities are the financial practices of the communities, the classification of the utilities, the matter of outside communities requiring service, and delinquent water bills. In the latter case in Wisconsin these become a lien on the property ahead of the mortgage.

Objects and benefits of the Public Service Commission are to put utilities on a self-sufficient business basis, to make uniform system of accounting and reports, to assure that the municipal utilities pay local school taxes, to build up reserves under the supervision of the commission, to make supplemental provision for revenue bonds for financing, to prevent interfund shifting, to require approval of extension plans, to permit classification of customers, to promote efficient management, and to permit the municipal utility to earn as much as private industry. These objects and benefits seem to be well worth while in Wisconsin and the Illinois audience was greatly interested.

Water Quality Depreciation in Distribution Systems

Mr. John R. Baylis, Physical Chemist, Bureau of Engineering of Chicago, reported on some observations and studies on the depreciation of water quality in distribution systems. (See also Marsden Smith, WATER WORKS AND SEWERAGE, March, 1944.) A case at point is that of water entering the mains with a coliform index of 0.29-0.30, whereas it was found that in outlying mains and dead ends the index was variable and often quite high.

Samples were collected from fire hydrants shortly after opening, then during flushing when the turbidity was highest, and then after the flushing had been completed and the water was no longer turbid. Indexes ran from 2 to 22,000 in the first samples, from 0 to 1,300 in the second samples, and from 0 to 13 in the third samples. There was no particular pattern, the samples becoming progressively worse or progressively better or going from good to bad to good, although sometimes in the latter case the third sample was not as good as the first. In many cases there was from a half to nearly 1 ppm. of residual chlorine.

Counts were usually high in turbid samples but the reverse was not true. Plankton increased with turbidity. When coliform bacteria were found in dead ends they were also generally found in houses along the line. After flushing, the counts returned fairly readily; that is, within a week or two similar results were obtained in the same locality. Similar results were found in outlying mains.

Counts seem to multiply in the

Programmers

John R. Baylis
Physical Chemist
Bur. of Engr.
Chicago, Ill.

L. R. Howson
Cons. Engr.
Alvord, Burdick & Howson, Chicago.

Among Those in Attendance

(1) *W. J. Downer, Chief San. Engr., Ill. Dept. Health, Springfield*
(2) *John Sperry, Sales Engr., American Well Works, Aurora*
(3) *E. L. ("Roy") Metz, Supt. Water Dept., Carthage*
(4) *John Goetz, Supt., Water and Sewage, Mattoon*
(5) *Capt. A. J. Steffen, San. Engr., 6th Serv. Command, Chicago*
(6) *Dr. Max Suter, Engr., Illinois State Water Survey, Urbana*
(7) *Carl Duy, Engineer, Water Department, Aurora*
(8) *George B. Prindle, Supt. Water Works, Highland Park*

sediment where chlorine cannot penetrate, but there have been no disease organisms found and no disease among consumers because the raw water is free of such organisms. Studies of the sediment from mains shows variable bacterial content but usually high in coliform organisms as well as counts.

Wartime Problems

Mr. John A. Goetz, Supt. of Water and Sewage in Mattoon, Ill., said that Mattoon had no particular wartime problems; thanks first to a good stock pile, and second, to Harry Jordan for his work in making priority assistance easier.

Mr. Goetz said he had been studying the wartime problems and believed that one of the largest was water supply for several industries. He pointed out that in several instances industry had gone to sewage plant effluents to obtain sufficient water supply. Mr. Goetz mentioned quite a number of locations, among them the steel plant which uses 20 mgd. of Baltimore sewage for cooling water and, of course, the Henry Kaiser Fontana Plant, which reuses all of its sewage.

Blueprint Now!

E. L. Filby brought to Illinois the story of "Blueprint Now" and the need for doing just that if we are to expect to combat unemployment during and after the transition period from wartime to peace industry. Illinois seems to be behind in its plans, particularly for water treatment. Of the list of post-war projects which were available at the time, 28 per cent of the value is in sewers, 12 per cent in sewage treatment, 5 per cent in water supply, and only 0.6 per cent in water treatment. Mr. Filby emphasized again, as he has elsewhere, the need for communities, and particularly for water and sewage works operators and superintendents, to start the ball rolling by outlining their needs as they see them, for they alone have the best knowledge of what is needed.

Association Affairs

Genial Sam Morris, President of the AWWA, was on hand to tell the Illinois Section of the affairs of AWWA, of the work it had done in the past year, of its growth, of the work of Secretary Harry Jordan, of the plans for the Milwaukee Conference, and of the desire of the officers of the association to continue to be of service to the men in the field.

Programmers

J. J. Woltmann
Acting Chief
State Water Surv.
Urbana

F. H. Weed
Regional Engr.
War Prod. Bd.
Washington, D. C.

Evening Session

This remaining section of the report was prepared by Dr. T. E. Larson, Chemist, Illinois State Water Survey, Urbana, Ill.)

At the evening banquet the Fuller Award was presented by W. R. Gelston to W. D. Gerber of the Illinois State Water Survey, with the following citation: "The Illinois Section confers the Fuller Award to Winfred D. Gerber, past secretary and past chairman of the Section, who through his efficient handling of the many assignments given him, and his keen understanding of human nature, has contributed much to the Illinois Section and the personal relationships of its members."

Entertainment of the evening consisted of the War Department Training Film, "Baptism of Fire," followed by some very excellent performance by local talent. Entertainers of Radio Station WMBD of Peoria provided a 5-piece band and organ, and 15 varied numbers ranging from sleight of hand to singing, dancing and musical solos.

Water Supply at Camp Ellis

Chester Miller, Supt. of Water Works gave an excellent description of development and operation of the water supply at Camp Ellis from the time of construction in 1942 to date. Water is obtained from a channel dam with crest 10 feet above the floor of Spoon River, the river flow varying from 10 to 20,000 cu. ft. per second. Turbidity of this water as obtained at the plant from May, 1943, to March, 1944, had varied from 50 to 20,000 ppm. Such abnormal turbidity required close con-

Also Present

Clyde Hum
PEMCO
Springfield

W. D. P. Warren
Cons. Engr.
Decatur

H. A. Tolburg
Neptune Meter Co.
Springfield

Carl N. Brown
U. S. Pipe Co.
Chicago

Cyrus Bird
Pitometer Co.
Chicago

trol and unusual alum doses for clarification, the maximum dose at times reaching 37 grs./gal.

Chlorination has proved to be a difficult procedure where doses of 2.5 or 5 p.p.m. failed at times to maintain a residual at the ends of the distribuiton system. The 4 mgd. plant was provided with a million gallon storage reservoir.

The distribution system consisted of 8 miles of wooden mains, 27 miles of cast iron and 13 miles of service lines. Two 500,000 gal. elevated tanks float on the line. The wooden mains were necessitated by a shortage in materials at the time of construction and are now being duplicated in cast iron.

WPB Regulations

Mr. F. H. Weed, Regional Engineer of the War Production Board discussed the trend in WPB regulations and indicated that although the basic U-1 order has been somewhat relaxed, there are still serious shortages and that water works development should not be overdone especially through this summer.

Although lumber and steel supplies are difficult to obtain, and copper is again becoming difficult, the worst hurdles for supplying water works involved transportation and especially man power. Conservation was urged in order that the result and effects would aid in saving fuel facilities, transportation and man power.

Conservation Program

Future prospects from the water works standpoint were discussed by H. Lloyd Nelson, Eastern Manager of the U. S. Pipe and Foundry Co. of Philadelphia and it was indicated that certainly within the next year considerable release of materials would be permitted providing man power is available; the question of man power being the controlling factor on all development proposed for some time. Mr. Nelson echoed Mr. Filby when he said, "The time is approaching rapidly when post war plans should be developed to the point where they can be put into immediate effect."

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

PUMP. Cecil W. Smith. U. S. 2,342,906. Feb. 29. In a reciprocating pump, an elastic covering about the piston to prevent seizure of piston by cylinder.

DEEP WELL SCREEN. Howard O. Williams and Albert E. Jens (to Edward Johnson, Inc.). U. S. 2,342,913. Feb. 29. A well screen structure comprising an inner screen member formed of spaced longitudinal supporting rods and a helix of wire welded to the inside elements of the supporting rods. U. S. 2,342,914. Feb. 29. A deep well screen, comprising a cylindrical screening member formed of a multiplicity of longitudinally extended rods spaced to form longitudinal drainage slots and a supporting member laid helically within these longitudinal rods.

APPARATUS FOR GOVERNING DEAERATION. Raymond E. Olson (to Taylor Instrument Co.). U. S. 2,343,317. Mar. 7. A controlled deaerating system operating in a deaerating tank with special features.

METERING DEVICE FOR SCREW FEEDS. John Roland (to Schwitzer-Cummings Co.). U. S. 2,343,707. Mar. 7. A metering device for a screw feed having a bin for containing the solid materials. (Not designed for water or sewage works field but may have applicability to dry feed of chemicals.)

WATER SOFTENING SYSTEM. Edmund A. Kathe (to Rainflo Manuf. Co.). U. S. 2,344,251. Mar. 14. A tank designed for softening water by the addition of a water soluble softening agent and passage of water through softening agent in bottom of tank using up-flow principle and discharging water from area of low pressure at top. Certain bypass and circuit designs are pertinent thereto.

DEAERATION OF LIQUIDS. John R. McDermet (to Elliott Co.). U. S. 2,344,554. Mar. 21. An apparatus for heating and deaerating water.

FLUID FLOW CONTROL MECHANISM. Donald E. Sperry and Adam Landess (¼ to Roland R. Crum and ¼ to James K. Burkhart). U. S. 2,344,747. Mar. 21. A valve having a fluid passageway and a control member and seat, with other features.

DEEP WELL SCREEN. Howard O. Williams and Albert A. Jens (to Edward E. Johnson, Inc.). U. S. 2,344,909. Mar. 21. A well screen with longitudinal elements and flat, outwardly disposed tops and converging side portions positioned so that said tops outline a cylinder and being closely spaced to provide inwardly expanding longitudinal screening slots and a helically wound wire as a part of the design.

PUMPING SYSTEM. John E. Armstrong, and Jack E. Piccardo (to Jacuzzi Bros. Inc.). U. S. 2,344,958. Mar. 28. A pump system comprising a pump unit having a plurality of stages arranged in series, suction line with injection nozzle and venturi tube with interconnections.

PUMP. Joseph B. Brennan. U. S. 2,344,964. Mar. 28. A design for a pump having a bore, the normal cross-section of which is defined by two concentric arcs of unequal radii, with vanes and curves adjacent to said arcs, and special features of the rotating member.

SEWAGE PATENTS

COMMINUTOR. Augustus C. Durdin, Jr. U. S. 2,342,927. Feb. 29. A comminutor comprising a rotary screen, and means for defining a path for a stream of liquid around the screen, an education passage within the screen, and vanes included in the said path and in general helical relation to the direction of said path, for the purpose of imparting a whirling or rotary movement to said stream.

MULTITRAY CLARIFICATION. William C. Weber (to Dorr Co., Inc.). U. S. 2,343,836. Mar. 7. A multitray clarifier comprising a plurality of superposed compartments two or more of which serve as thickening chambers and the others as sedimentation chambers.

SEWAGE TREATMENT. Hubert L. Olin. U. S. 2,345,828. April 4. A process comprising the addition of an ionizable substance and a slurry of sodium bentonite to sewage to produce a hydrous floc to entrain sewage dispersoids, followed by separation of liquid therefrom.

CLARIFICATION AND PURIFICATION OF INDUSTRIAL LIQUORS. Walter G. Moran and Sanford Cole (to National Lead Co.). U. S. 2,346,320. April 11. A process for clarification of industrial acid liquors containing suspended matter by forming an insoluble metal sulphide therein, together with a coagulating organic colloid.

A.W.W.A. MILWAUKEE PROGRAM

A Preview

JUST as we go to press the Technical Program, covering the Milwaukee Conference of A.W.W.A., June 13-16, inclusive, is being released. Although at this writing it is subject to minor changes and it is not to be different in its final draft in any major category.

In our April issue we listed some of the highlights of the program and find now that, although the dates were correct in this item, a slip occurred in giving the several activities for the various days of the week. The Conference officially opens on June 13th which is a Tuesday and not Monday as stated in the April item. The Conference officially closes on Friday, June 16, at noon, followed by a meeting of the new Board of Directors.

The Annual Dinner followed by dancing will be held on Thursday rather than on Wednesday evening, as stated in our April item, and on Wednesday evening will be held the special evening program devoted to "Postwar Planning for Water Works" and "Collective Bargaining in the Professional and Municipal Field." The first topic will be presented by Colonel W. M. Carey (U. S. Engineers) of the F.W.A. and Abel Wolman. A.W.W.A. has, since our April preview of the program, been successful in securing A. M. Rawn, of Los Angeles, to discuss the matter of employee organization and collective bargaining in the professional and municipal fields. Mr. Rawn, as Chairman of A.S.C.E.'s Committee on Employment Conditions in the professional engineering field, is, thereby, especially well informed on this subject and his address may well prove the greatest drawing card of the special session. Certainly this is a topic of considerable interest to managers of municipal utilities, as well as to employes, and the sooner all concerned learn what to look forward to in respect to organized employee groups in the municipal and public utility field the happier will be the understanding of all concerned. Mr. Rawn has dug deeply into this question and appears before A.W.W.A. as the best prepared man on this worrisome question that could be found.

On Tuesday evening the customary reception to the President of A.W.W.A. and Mrs. President will be followed by dancing. The ladies attending the Conference will be entertained in the customary manner of previous A.W.W.A. Wartime Conferences.

There seems to be little doubt but that the Milwaukee Conference is to be better attended than any of the recent meetings, hotel reservations being the most certain index in this direction. For instance, by April 11, just 701 rooms had been reserved in the five Milwaukee hotels as compared with only 315 rooms reserved at Cleveland hotels the same period ahead of the 1943 Conference and 651 rooms in Chicago hotels for the heavily attended 1942 Conference.

At this date the only certain way of securing hotel accommodations for the Milwaukee Conference is to address the request for the type of room desired and number of occupants to the Convention Bureau, Milwaukee Association of Commerce, 611 North Broadway, Milwaukee 2, Wis. This agency assures A.W.W.A.'s Convention Management Committee that those desiring to attend the Conference will be taken care of in one or another Milwaukee hotel—and this should prove a consolation to many who have been unsuccessful in obtaining just the accommodations requested from the hotels of their choice.

THE PROGRAM

The following Technical Program speaks for itself. The topics are timely and the speakers, we believe, represent a careful selection from the field. Many need no introduction to the readers of this magazine.

TUESDAY (JUNE 13) AFTERNOON
Plant Management and Operation Division
(FRANK C. AMSBARY, JR., *Chairman*)

The Design and Construction of the Milwaukee Water Works System
Jos. P. Schwada

The Operation and Maintenance of the Milwaukee Water Works System
Herbert H. Brown

Development of Centrifugal Pump Discharge Valve Control at Milwaukee's Riverside Pumping Station
H. B. Hoefer

Metropolitan Water Supply Developments
Samuel B. Morris

Practical Studies of Distribution Systems
Geo. W. Booth

TUESDAY (JUNE 13) AFTERNOON
Water Purification Division
(A. CLINTON DECKER, *Chairman*)

Experiences With Breakpoint Chlorination
C. D. Adams

Practical Use of the Ortho-Tolidine-Arsenite Test for Residual Chlorine
F. W. Gilcreas F. J. Hallinan
Discussion
A. E. Griffin L. J. Alexander

The Mechanism of Destruction of Microorganisms in Water by Chlorine and Chloramine
S. L. Chang

TUESDAY (JUNE 13) AFTERNOON
Water Works Practice Committee—Open Session
(MALCOLM PIRNIE, *Chairman*)

Review of Sub-Committee Progress

Cast-Iron Pipe
Reinforced Concrete Pipe
Steel Pipe
Valves
Hydrants
Steel Standpipes and Elevated Tanks
Meters
Cross Connections

WEDNESDAY (JUNE 14) MORNING
General Session
(SAMUEL B. MORRIS, *Presiding*)

A Review of the Cost of Water Works Structures
Chas. B. Burdick

Survival & Retirement Experience With Water Works Structures—A Committee Report
E. H. Aldrich

Depreciation Record Practices—Good and Bad
N. T. Veatch, Jr.
Depreciation—A Committee Report
Louis R. Howson

WEDNESDAY (JUNE 14) MORNING
Water Purification Division
(A. CLINTON DECKER, *Chairman*)
The Bacteria in The Distribution System
A. M. Shannon and W. M. Wallace
Influence of Various Chemicals on Palatability of Drinking Water
J. W. Hassler and Martin Faye
Permissible Loadings and Capacities of Water Treatment Plants—A Committee Report
Douglas Feben
A Consolidated Coliometer for Streamlined Water Bacteriology
A. A. Hirsch
Business Meeting

WEDNESDAY (JUNE 14) AFTERNOON
Plant Management & Operation and Finance & Accounting Divisions—Joint Session
(FRANK C. AMSBARY, JR., and A. P. KURANZ, *Co-Chairmen*)
Symposium on Water Works Management and Administration
Discussion Leaders
Wendell R. LaDue D. L. Erickson
John S. Longwell Chas. E. Moore
Wisconsin's Concept of Water Utility Regulation
W. F. Whitney
Management and Control of Public Water Supply Services in the Other American Republics
Harold B. Gotaas Robt. D. Mitchell

WEDNESDAY (JUNE 14) AFTERNOON
Water Purification Division
The Economics of a De-Ionized Water Supply
Frank Bachmann
Diatomite Water Filtration Developed for Field Troops
Hayse H. Black Chas. H. Spaulding
Calcining Sludge From a Water Softening Plant
H. V. Pedersen
Recovery of Calcium Carbonate or Lime From Water Softening Sludges
Robt. T. Sheen H. B. Lammers
Discussion
C. W. Gordon F. G. Nelson

WEDNESDAY (JUNE 14) EVENING
Public Meeting—Engineers
Grand Ballroom—Schroeder Hotel
(*President* SAMUEL B. MORRIS, Presiding)
Planning for Postwar Construction
Col. Wm. N. Carey
The Principles of Postwar Planning for Water Works
Dr. Abel Wolman
Labor Organization in the Professional and Municipal Field
A. M. Rawn

THURSDAY (JUNE 15) MORNING
General Session
(*Pres. Elect*, SAMUEL F. NEWKIRK, JR., Presiding)
Financing and Constructing Inter-System Connections
N. L. Nussbaumer H. T. Critchlow
Program and Policies of Office of War Utilities
Edward Falck
Program and Policies of Water Division of O.W.U.
Arthur E. Gorman
The Legal Limits of a Water Supply System
John H. Murdoch, Jr.
Discussion
Boyd A. Bennett

THURSDAY (JUNE 15) AFTERNOON
General Session
(*President* SAMUEL B. MORRIS, Presiding)
The Promotion of Water and Sewage Works Developments
E. L. Filby
Concrete Facts Related to Postwar Planning of Water Works in New York State
Earl Devendorf
Plans for Postwar Water Works Construction in the Southwest
Homer A. Hunter
Financing Water Works Improvements in the Pacific Northwest
Gustave B. Schunke
The Economics of Electric Power Pumping
C. A. Richardson

THURSDAY (JUNE 15) AFTERNOON
Steel Pipe Committee—Open Session
(WM. W. HURLBUT, *Chairman*)
Report of Current Activities of the Steel Water Pipe Committee
Wm. W. Hurlbut
The Camp Robinson Water Supply Line
W. L. Patterson
Behavior of Steel Pipe Under Embankments and in Trenches
R. E. Barnard
Charting the Future for Postwar
Bennett Chapple
Dixie Pipe Line—A color-sound motion picture

FRIDAY (JUNE 16) MORNING
Finance & Accounting Division
(A. P. KURANZ, *Chairman*)
Modernizing Meter Rates
Chas. H. Capen
Balancing the Production and Sales Record
A. P. Kuranz
A Symposium on Wartime Problems of Jointly Administered Water and Sewage Works
Leonard N. Thompson
Thos. L. Amiss James W. Myers, Jr.
Wendell R. LaDue John W. Pray

FRIDAY (JUNE 16) MORNING
Committee on Ground Water Supplies—Open Session
(J. ARTHUR CARR and JAMES C. HARDING, *Co-Chairmen*)
Specifications for Deep Wells and Deep Well Pumps
U.S.P.H.S. Sanitation Manual for Ground Water Supplies—A Discussion

FRIDAY (JUNE 16) MORNING
Water & Sewage Works Manufacturers Association Business Meeting
Engelmann Hall—10:00 A.M.

A WATER SUPERINTENDENT'S INTEREST IN SEWAGE TREATMENT*

By RICHARD E. BONYUN
General Superintendent
PASSAIC VALLEY WATER COMMISSION
PATERSON, N. J.

THE strength of a nation depends primarily upon the health of its people, and in this respect the preservation of the purity of water for domestic use is of great importance. Progressive development in the fields of sanitation and water supply has played a large part in attaining the excellent health record which our nation enjoys today. These two fields of endeavor are closely related, since the one has a direct bearing upon the other.

We have come a long way since the days of serious epidemics of typhoid, cholera, dysentery and all water borne diseases attributable to inadequate methods of sewage disposal, and consequent contamination of the water supply. However, in spite of the very great improvement in water supplied to our towns and cities, with consequent reductions in typhoid death rates, water supply problems are increasing in the country as a whole.

Many public potable water supplies are taken from rivers and streams with hundreds of square miles of drainage area. Most of the drainage area is usually not the property of the owner of the water supply. The control of pollution on such large watersheds is a problem requiring the permanent employment of experienced watershed personnel.

Heavy Responsibility on Water and Sewage Works Managers

Since these problems are seldom, if ever, in one municipal jurisdiction, the comprehensive treatment of such problems to protect the public welfare, imposes a responsibility upon the State Department of Health, and a heavy direct responsibility is placed on the Water Superintendent and on the Sewage Plant operator.

As the Superintendent of the Passaic Valley (N. J.) Water Commission, it will be better for me to describe our water supply system and operations as they pertain to this subject, with the hope that it may be of interest to you and may indicate how any superintendent of a similar supply is interested in the subject of sewage treatment and waste disposal on his watershed.

*This paper, read before the New Jersey Sewage Works Ass'n., is here printed by authorization of the Association and the Federation of Sewage Works Associations.

The Author

The Passaic Valley Commission System

The Passaic Valley Water Commission owns and operates the water supply and distribution system for the Cities of Paterson, Passaic and Clifton, N. J. It also sells water at wholesale to many other municipalities and water companies adjacent to its system, which is extensive. The total population served is approximately 350,000 people. The water works system was previously owned and operated by the Passaic Consolidated Water Company, whose holdings were purchased outright by the three cities through the Commission in 1930.

Two sources of water supply are owned, namely, 37¾ million gallons per day in the Wanaque Project and water rights in the Passaic River up to 75 million gallons per day. The Wanaque Reservoir headworks and aqueduct are operated by the North Jersey District Water Supply Commission acting as agent for the eight municipalities who own the supply system. The Passaic River source of water supply is owned outright by the Cities of Paterson, Passaic and Clifton and is operated by the Passaic Valley Water Commission with intake, Purification Plant, and Pumping Station located in Totowa Borough and known as the Little Falls Plant, which when originally built made filtration history. Water is drawn from both sources, depending upon the demand, which is at present averaging approximately 56 million gallons per day, of which twenty-nine are being taken from the Wanaque Reservoir and twenty-seven from the Passaic River.

The Passaic River has been used as a source of public potable water supply for Paterson and vicinity since 1857, the original intake of the Passaic Water Company, at that time, being at the Great Falls in Paterson. In 1899 headworks were constructed and intake transferred upstream to Little Falls, about five miles above Paterson. In 1902 the Filtration Plant was constructed and at that time it constituted the first adaptation of concrete box type filters and represented the largest and most modern rapid sand filter installation in the country. Forty-two years later this same plant is being operated by the Commission in the purification of its Passaic supply.

The watershed of the Passaic River above our intake at Little Falls is approximately 770 square miles in area, of which approximately 275 square miles have been appropriated on tributaries for other water supply developments, namely, the Pequannoc, Rockaway and Wanaque. Thus the Commission is interested in approximately 500 square miles of drainage area tributary to the Passaic River above its water supply intake. This is a large area, fairly heavily populated and located thereon are such towns as Butler, Essex Falls, Caldwell, Morristown, Chatham, Madison and others.

A Watershed Patrol Maintained

In order to protect its water supply and to control pollution, the Commission maintains a Watershed Patrol consisting of two inspectors deputized by the State Department of Health, who work under the direction of our Chemist and Superintendent of Filtration. The work done includes inspections, into which enter the collection and analysing of effluent samples of all sewage disposal plants and industrial waste treatment plants discharging into the water courses. Careful watch is also maintained for the establishment of new factories, garbage dumps, cess pools and other operations, wherever they may be, which might have an effect upon the quality of the water in the river.

Stream samples are taken and analysed periodically from points along the tributaries of the Passaic

River, and, of course, raw water samples are taken three times daily at the plant intake. In this manner a close check is maintained on the water in the streams, and when results from the examination of samples dictate it, investigations as to cause are conducted.

We have encountered problems in regard to industrial waste disposal, such as the effluents from paper mills, dairies, rubber reclamation plants, etc. The improper or ineffective treatment of such wastes create water supply problems in respect to taste and odor, suspended solids, bacteria and changes in pH value and chemical character of the raw water.

Minimum Standards for Effluents Adopted

As a practical measure to facilitate this work, and to provide a "yard stick," the Passaic Valley Water Commission adopted certain "Minimum Standards" for waste effluents discharged into the streams of the watershed above its potable water supply intake at Little Falls, N. J. These Minimum Standards were set up after careful thought and upon the recommendation of Consulting Engineers, and are intended to apply to all types of effluents including industrial waste disposal, and are as follows:

1. The effluent shall contain no free titratable acidity or free caustic alkalinity. The pH of the effluent shall be between 4.0 and 8.3.
2. The effluent shall be free of toxic substances.
3. The effluent shall be free of noticeable floating solids, scum, oil, grease, or sleek.
4. The effluent shall be sufficiently free of color or turbidity, or both, so that after dispersion in the receiving waters, (not more than 1,000 feet below the point of effluent discharge), it will not noticeably discolor or add to the turbidity of the receiving waters.
5. The effluent shall be free of offensive odors.
6. The effluent shall be of such quality that organisms of the coliform group shall be present in not more than 20% of the 1 cubic centimeter portions examined from any single sample or any series of samples of effluent tested. For the purpose of the test for organisms of the coliform group a sample shall consist of 5 one cubic centimeter portions.
7. The effluent shall have a biochemical oxygen demand not exceeding in the average over any 4-hour period of a day 60 parts per million, and not exceeding *at any time* 80 parts per million.

Sewage Treatment Has Good Record on Watershed

As regards sewage disposal plants, it can be said that we have experienced very little difficulty on account of their operations and their existence on the watershed. As you know, such plants are supervised by operators licensed by the New Jersey State Department of Health under the provisions of Article 5, R. S. 58:11. All the municipal sewage treatment plants on our watershed conform to the policy of the State Department of Health requiring sedimentation, oxidation, and chlorination as the minimum degree of treatment. We have frequently found some effluents so good as to comply with U.S.P.H.S. Drinking Water Standards for Bacteria. From a water supply standpoint we are particularly interested in the chlorination of the effluent. There have been occasions when an increase in the bacteria count on river water samples, taken at the Little Falls intake, has been attributable to the failure of the chlorinating equipment on a sewage disposal plant effluent. This results in the "seeding" of the river, and endangers the water supply. Thus it is important to us that the sewage disposal plants on the watersheds be maintained and operated efficiently at all times.

In closing I would like to emphasize the importance of our responsibility—the joint responsibility of water superintendents and sewage plant operators—and the necessity of working together. Millions of dollars have been spent in New Jersey to construct our plants to protect potable water supplies, and we have been entrusted with the operation of the plants. It is our duty and obligation —legally and morally—to maintain effective operation. And, we must, through close cooperation, protect our potable water stream from all encroachments within our power.

Prof. Camp Opens Consulting Office

Thomas R. Camp, Professor of Sanitary Engineering at Massachusetts Institute of Technology for the past fifteen years, has announced his resignation to open offices for full time practice as a consulting engineer.

Mr. Camp is a graduate of Texas A. & M. College in 1916 and received a masters' degree from M. I. T. in 1925. His experience including his professorship at M. I. T. has covered some twenty-five years in hydraulic and sanitary engineering, and his practice has included association with the late John B. Hawley, in Texas, with the firm of Spoon, Lewis and Camp in North Carolina, and with the late Alexander Potter in New York and New Jersey.

Prof. Camp has authored thirty-five technical papers and discussions, including three chapters on Water Supply in Davis' Handbook of Hydraulics. Active in research and development work, Mr. Camp holds five patents in the field of water and sewage treatment. Mr. Camp was the first recipient of the Karl Emil Hilgard Hydraulic Prize of the American Soc. of Civ. Engrs., and has received both the hydraulic section prizes of the Boston Society of Civil Engrs. He is also a member of AWWA, NEWWA, NESWA and many other technical organizations.

Thos. R. Camp, C. E.

Mr. Camp will have offices in the Statler Office Bldg., Boston, and will specialize in water works and sewerage, municipal and industrial wastes, stream sanitation, and flood control.

New York Section Elects

At the Annual Spring Meeting of the New York Section of AWWA held in Utica, April 27-28, new officers were elected for the ensuing year.

Chairman—Allan Rogers, Supt. of Public Works, Garden City, L. I., N. Y.

Vice Chairman—William H. Clark, Supt. of Water, Avon, N. Y.

Trustee—J. McClure Wardel, Supt. of Public Works, Hudson, N. Y.

AWWA Director — Hugh Dewey, Mgr., Western N. Y. Water Co., Buffalo, N. Y.

The Fuller Award for 1944 was voted to E. J. Rowe, Supt. of Water, Light and Power at Wellsville, N. Y.

MICHIGAN SEWAGE WORKS ASSN.'S 20TH CONFERENCE

WELCOMED by Dean H. B. Dirks of the Div. of Engineering of Michigan State College, the Michigan Sewage Works Association met in the Union Building of the College, in East Lansing, Mich., on April 5th and 6th. Dean Dirks commented on the relatively small gathering of 88 registrants, pointing out that the program contained the names of 66 members of the association now in military service, a fact which undoubtedly affected the attendance considerably.

Presidents

Present	Past
Paul Stegeman Supt. Water & Sewage Midland, Mich.	*C. P. Witcher Supt. Sewage Treat. Ann Arbor, Mich.*

The conference was preceded by a Short Course School for Sewage Treatment Plant Operators under the direction of members of the faculty of Michigan State College and sponsored as in past years by the College, the Association, and the Michigan Dept. of Health. Registration for the short course numbered thirty-five, of whom eighteen were "freshmen" and six were completing the three-year course. Dean Dirks called attention to this ratio of three beginners for each person who finished the course. This is the same ratio as obtains for college enrollment (in normal times) and the Dean wondered what happened to the two-thirds of the starters who never finish.

Not a part of the scheduled program was a very impressive presentation of a flag of the United States to the Association by N. G. Damoose, Director of Public Works at Battle Creek, Mich. In presenting the flag Mr. Damoose requested that the association never convene without the colors in the standard at the dais. Mr. C. P. Witcher, Pres. of the Association accepted the colors on behalf of the Association.

Business Meeting

New officers of the Michigan Sewage Works Assn. were elected for the year 1944-45, as follows:

President—Paul Stegeman, Supt. of Water Works and Sewerage, Midland, Mich.

Vice Pres.—B. A. DeHooghe, Supt. Sewage Treatment, Gladstone, Mich.

Secy.-Treas.—R. J. Smith, Mich. Dept. of Health, E. Lansing, Mich.

Director—C. T. Mudgett, Supt. Sewage Treatment Works, Muskegon, Mich.

R. B. Jackson, Plant Engr. of the Jackson Sewage Treatment Plant, will continue as director, and C. P. Witcher, Past Pres., became a director in accordance with the association constitution.

Mr. E. F. Eldridge who has a leave of absence from the Mich. Engr. Expt. Station to become Civilian Consultant to the R and U Branch of the U. S. Army Engrs. in the 9th Corps Area at Salt Lake City, Utah, was given a leave of absence as Representative to the Federation Board of Control for Michigan, and W. F. Shephard has been designated as his proxy for the duration of this military assignment.

Secretary — *R. J. Smith, Mich. Dept. Health, E. Lansing, Mich.*

Director — *C. T. Mudgett, Supt. Sewage Treat., Muskegon, Mich.*

Mr. W. H. Wisely, Exec. Secy. of the Federation made a formal presentation of the "Kenneth Allen Award" to E. F. Eldridge, Research Engineer, Engineering Experiment Station, Michigan State College, for his outstanding service to the Michigan Association. This Kenneth Allen Award is made by the Federation to the person selected within an individual association, each Association making such a choice once every three years.

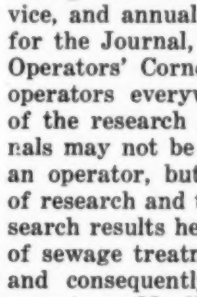
Mr. W. F. Shephard, Mich. Dept. of Health, was designated to contact the Michigan State College Agricultural Experiment Station relative to undertaking an investigation of the value of sewage sludge as a fertilizer or soil conditioner.

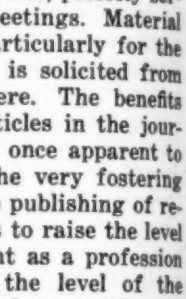
The Federation

Carrying out his intent to bring the benefits of the Federation of Sewage Works Associations to the membership of the several associations, W. H. Wisely, Exec. Secy., and Editor, was present to talk on the "Progress and Objectives of the Federation."

In brief some of the benefits to operators were pointed out as journal articles, chapters of a book on Sewage Works Practice, priority service, and annual meetings. Material for the Journal, particularly for the Operators' Corner, is solicited from operators everywhere. The benefits of the research articles in the journals may not be at once apparent to an operator, but the very fostering of research and the publishing of research results helps to raise the level of sewage treatment as a profession and consequently, the level of the operators. Mr. Wisely says, "Even if you can't understand all the formulas and mathematics in the articles, read the conclusions of the article to find out what has been learned that is new and what may someday affect the processes of sewage treatment."

Mr. Wisely had with him the final draft of the report of the Committee on Occupational Hazards, it having just been received from the Chairman of that committee, Le Roy Van Kleeck, of the Conn. Dept. of Health.





Representatives to Federation

On Leave	Proxy
E. F. Eldridge Res. Engr. Engr. Expt. Sta. Mich. State College	*W. F. Shephard Engr. Mich. Health Dept. E. Lansing, Mich.*

This report, which will become a chapter in the book on Sewage Practice, will be distributed to every member of the various associations as soon as it is printed.

As to priority service, Mr. Wisely reminded the audience of the yeoman's job done by A. M. Rawn, Pres. of the Federation, in his work as Consultant to WPB in the preparation of Order P-141 and subsequent revisions. Mr. Rawn is still Consultant to WPB in this respect and problems of sewage plant operators as to priority, etc., will continue to receive prompt attention and solution.

A. H. Niles
Supt. Sewage Treatment
Toledo, O.

T. J. Powers
Waste Disp. Dept.
Dow Chem. Co.
Midland, Mich.

E. L. Filby
Field Director
Blueprint Now!
U. S. A.

W. H. Wisely
Exec. Secy. & Ed.
Federation of Sewage Works Associations

Programmers

A new feature of service by the Federation is "Personal Service." If an operator has a question he may write directly to Mr. Wisely, who will either answer the question himself or refer it to some one else familiar with the particular problem involved. (Ed Note: As Mr. Wisely attends these various association meetings bringing to the operators the service of the Federation it becomes more and more apparent that the Federation is no longer just a journal publishing organization, but is a living vital force and factor in the future of the art of sewage treatment. There is no doubt but that it will grow stronger and stronger and will one day unify the various associations into one national organization of service to the field.)

The Practical Side of Safety

Under the above title, Mr. W. D. Wilt, Safety Officer, Dept. of Water Supply, Detroit, Mich., called attention to the loss of life and loss of man hours occasioned by accidents. With 30,000,000 man hours loss per year the value exceeds $2,700,000,000 per year with a loss of life of over 18,000 per year in industrial accidents.

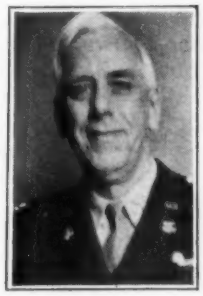
Causes of accidents may be either personal faults, or mechanical faults. Personal faults include ignorance, disobedience, chance taking, short cuts, and physical defects. Mechanical faults include unsafe design, unsafe openings, improper light, poor sanitation, and improper clothing.

Part of the training of new employees in safety includes the emphasizing of hazards. "What is an accident?" "Any occurrence that interferes with or interrupts normal activity." Ten per cent of accidents are from unsafe acts and of these one per cent will be fatal.

Care should be taken with electrical installations where possibility of explosive gas mixtures exists. Nailless shoes, explosion-proof flashlights, and beryllium non-sparking wrenches are recommended for such places.

Hand tools are important in safety. The right tool should be selected.

The Old Maestro
James R. Rumsey
Greeley & Hansen
Representative
Grand Rapids, Mich.



World Traveller
Lt. Col.
Arthur Morrill
U.S.P.H.S. (R)
Burma, India, Ethiopia, China

Worn tools are not good tools. Sharp tools are safer than dull ones. All tools should be stored safely.

Mr. Wilt also spoke on the use and abuse of fire extinguishers, dust filters, and first aid stations as well as outlining the various industrial gas hazards and the means of combating each.

There is a practical side to safety. "No accident ever did anyone any good."

Sludge for Fertilizer

This topic presented by A. H. Niles, Supt. of Sewage Treatment, Toledo, Ohio, brought forth a vigorous discussion particularly of the discussor's discussion. Mr. Niles' paper was a new approach to the subject and showed evidence of considerable research and study. Mr. Niles' study was made in an effort to counteract the propaganda against sewage sludge such as has often been raised by fertilizer companies, and at the same time to try to evaluate sewage sludge before some over-enthusiastic operators presented to the public claims that could not be substantiated.

"What makes sewage sludge tick?" asked Mr. Niles, and then answered his own question by saying, "Certainly something besides its content of nitrogen, phosphorus, and potassium." This is obvious from the history of the use of human excreta as fertilizer in China and Europe. Such material is, however, poor as fertilizer when compared to chemical fertilizers.

"What then makes sewage sludge such a good soil conditioner?" For one thing it has been found to contain nitrogen fixing bacteria and when moistened and allowed to stand for seven days it will increase its nitrogen content by 20 per cent. These bacteria are spore formers, the spores of which will be killed if the material is dried above 140 deg. F. Thus sludge will furnish nitrogen fixation bacteria to the soil. For another thing, sludge has a mechanical effect on the soil, lightening heavy soils and vice versa.

A study of agricultural reports indicates that there are thirty-three different chemicals in growing plants. Of these thirty-three some are required only in small quantities. These various chemicals include aluminum, iron, boron, calcium, copper, cobalt, magnesium, manganese, zinc, sulphur, and many others. Each has some specific beneficial effect on plant life, and of the thirty-three, twenty-nine are found in the digested sludge at Toledo. Mr. Niles gave a complete analysis of "Tolegro," the sludge from Toledo, as to its mineral content. So far as is known this is the first complete analysis ever made of a large composite sample amounting in its original size to more than a ton. Results are reported in pounds per ton.

In addition to these chemicals it has been shown that sludge contains auxomes or vitamins for plants. Experimental results indicate that better results are obtained with sewage sludge than with chemical fertilizers and yet Mr. Niles admits that the best part of the sludge, the auxomes derived from indol and skatol, are largely drained away in the liquid from the drying sludge. Mr. Niles cited the experience of Damoose at

Battle Creek and Backmeyer at Marion, Ind., both of whom have used liquid digested sludge with almost amazing results. (Damoose claims a Vitamin B_1 content, and Kraus at Peoria, Ill., has demonstrated riboflavin in sewage.—This question certainly is worthy of further research investigation.)

Mr. Niles closed by suggesting that where additional amounts of nitrogen, phosphorus or potash were needed they might be added to the sludge to enhance its value in those particulars.

In discussing Mr. Niles' paper, Percy O'Meara, Feed and Fertilizer Chemist, Mich. Dept. of Agriculture, took issue with some of the statements made by Mr. Niles, but admitted that he was not taking issue "too much." The Dept. of Agriculture takes a conservative attitude toward these new materials while having done little to study them.

Mr. O'Meara had made a number of analyses of different sludges. He noted the following: Sludges vary in composition as to relative amounts of organic and mineral matter. — All sludges are high in mineral matter.— Milorganite has a higher nitrogen content than other sludges.—This difference he attributes to the presence of mineral matter (from streets) in other sludges thereby diluting the nitrogen content.—the ash content of most sludges he analyzed ran from 70 to 80 per cent.

Mr. O'Meara's comments about Milorganite and about the ash content of digested sludges brought down a storm of protest. Mr. James Rumsey of Grand Rapids called attention to the error in the explanation of the reason for higher nitrogen content in the Milwaukee sludge, and Mr. Damoose of Battle Creek said that if Mr. O'Meara's analyses were correct, then every sewage plant laboratory in the country had been making the determination of volatile matter and ash incorrectly. Mr. O'Meara also said that the content of calcium in sewage sludge was too much for, and not good for lawns. This seems at variance with the numerous observations of sewage plant operators throughout the country.

The criticisms of Mr. O'Meara's premises and observations undoubtedly swamped his plea for a conservative attitude toward the material. The discussion did bring forth the request that the Agricultural Expt. Sta. undertake an investigation (see under Business Meeting above).

This reporter asked why it was necessary to call sludge, fertilizer. Mr. Damoose said Battle Creek calls its material, "Plant Food." Mr. Niles stated that in Ohio it was necessary to have a license to sell the material, inasmuch as it contained nitrogen, phosphorous, and potash, and showed the amounts of each in the analysis. For that reason it had to be classed as a fertilizer. Michigan likewise requires a license which legally makes sludge a fertilizer and therefore competitive with the fertilizer industry as such.

Donor and Flag

N. G. Damoose
Dir. Public Service
Battle Creek, Mich.
(Two years ago "Ance" told what Democracy meant to him. This year he showed it by presenting the Colors to the Association.)

One member of the audience remarked that despite the attitude of the Michigan Dept. of Agriculture, there are a great many plants which will in the future sell digested sludge for fertilizer or soil conditioner.

Round Table—Small Plant Maintenance

Under the leadership of C. P. Witcher, Supt. of Sewage Treatment at Ann Arbor, a round table was held on the subject of small plant maintenance. Unfortunately, time did not permit a full discussion of the topic, but some comment was made on wear on chains and buckets in grit chambers, on comminutors and on mechanically cleaned screens. Two comments stood out: that detritors should be covered, and that grit chambers should be placed ahead of comminutors.

Activated Sludge Plant on Chemical Process Wastes

T. J. Powers, Waste Disposal Dept. of the Dow Chemical Co., Midland, Mich., reviewed the past history of the operation of a biological treatment plant for phenol wastes of the Midland Plant of the Dow Chemical Co. It was determined that biological treatment was the cheapest and the first two sprinkling filters were constructed in 1938 because it had been demonstrated that these rugged units could withstand considerable shock. This shock resistance is apparently possible because of the tremendous inventory of organisms on the rocks although but a small part of the growth may be functioning at any time.

In 1940 two more filters were constructed but following the onset of war and increased plant capacity, it was obvious that additional treatment capacity was necessary. At that time it was decided to add an activated sludge plant to operate on the discharge of the trickling filters.

The critical factor in operation is winter capacity. Whereas a trickling filter will operate at 90 per cent of capacity at 70 deg. F. the efficiency drops to 50 per cent at 55 deg. F. Therefore the size of the plant depends on the winter capacity.

The increase in phenol load on the waste disposal plant is indicated in the following table:

Year	Lb. per day of phenol
1938	930
1939	1250
1940	1850
1941	2550
1942	3023
1943	4200

The plant consists of a grit chamber to remove disintegrated slag from the filters before the aeration tanks, four filters, 142 ft. in dia.,

Speakers Do Their Stuff

(1) Dean Dirks Welcomes, (2) C. P. Witcher Presides, (3) W. H. Wisely Informs, (4) W. D. Wilt Advises, (5) A. H. Niles Enlightens, (6) Percy O'Meara Discusses, (7) G. R. Sidwell Suggests, and (8) N. G. Damoose Expounds.

and a clarifier, 140 ft. in dia. plus a large lagoon which acts as a storage space for extra strong wastes and for the discharge of the sludge from the clarifier. In the winter any load over 4000 lb. per day is stored in the lagoon as are shots of high concentrations of phenol or acid wastes. Strong wastes are mixed with the dilute waste in order to keep the concentration of phenol going on the filters at 30 to 45 ppm. depending on the time of year.

Two thirds of the phenol load is removed on the filters while the activated sludge plant, which acts to polish off the roughing filters and reduce the phenol content to the irreducible minimum, removes about one third of the load. A 25 per cent return sludge is used and the mixed liquor contains 2500-2600 ppm. of solids.

Hourly control is maintained, with tests for phenol and acid. In case of slugs of strong waste the flexibility of the plant can be brought into play. Strong wastes can be discharged directly to the lagoon. If the waste has already reached the filter, the effluent from the activated sludge plant may be recirculated until the filters recover. The same is true if the slug reaches the aeration tanks. So far this flexibility has more than demonstrated its worth.

Regulation of Sewer Use

Mr. G. R. Sidwell, Staff Atty., Mich. Municipal League, Ann Arbor, told of the problems of the private sewer, of sewers just over the municipal line, of sewers in real estate developments.

Where standards are not set for such sewers the problem is aggravated when connections to trunk sewers are made. Sewers outside of the city limit but connected to the city system should be wiered and charges made for the volume discharged into the municipal system.

As to the problem of sewer rental charges, Mr. Sidwell says a full concept of the problem should recognize that in truth the disposal of "used-water" is part of the water system and therefore it is right and proper to attach the sewer rental bill to the water bill and base it thereon.

As to sewer use, Mr. Sidwell says that the worst problem is that of fats and greases discharged into the system. Grease traps are not enough to solve the problem, either because they are not properly designed, are under capacity, or do not receive proper attention. Mr. Sidwell suggests that to insure proper operation there must be inspection by the city and it is quite likely that the health department may find it easier to do the inspections as part of other inspection duties than it would be for the sewer department to make the inspections.

Chemical wastes must receive individual study; acid wastes should be neutralized, gasoline wastes, oil, and dry cleaner wastes should be forbidden discharge to the sewers.

Unless there is a treatment plant constructed as part of a project it is unfair to set up sewer rentals to pay for sewers alone. It is particularly unfair to older residents who have already paid assessments for their own sewers. In the case of sewage treatment all users benefit alike and therefore sewer rental is the most fair practice.

Among Those Present

Stanley Mogelnicki
Waste Disp. Dept.
Dow Chem. Co.
Midland, Mich.

C. A. Habermehl
Chemist
Sewage Treatment Plant
Detroit, Mich.

Richard Foster
Ass't Engr.
Mich. Dept. of Health
E. Lansing, Mich.
(Hard working Asst. Secy.)

As to the question of controlling fringe communities around municipalities, Mr. Sidwell suggests that in Michigan this is possible through the county road commission which alone has authority to handle such a situation. It is possible for a municipality to charge double the service rate to fringe communities and most municipalities do so on the theory that the residents moved out of the city to escape the costs of municipal government but want to retain the advantages of its service.

The Why and How of Blue Print Now

Michigan may expect the highest percentage load of returning workers of any state in the union. It will be necessary for Michigan to absorb 58.5 per cent of its 1940 full time employment. As such it must look toward post war planning to bridge the gap between war and peace time employment.

Mr. Filby told the conference how to go about planning for the future, what plans may be found to be the quickest of fulfillment, why it is necessary to actually make the blueprints now, why efforts should be made to arrange for local financing, and who should start the ball rolling.

Post War Planning for Michigan

In the absence of P. J. Hoffmaster, Director of the Michigan Dept. of Conservation, Milton P. Adams, Exec. Engr. of the Stream Control Commission read the paper on the above title.

Pointing out that water was Michigan's most important resource, Mr. Adams said that there are 36,000 miles of rivers, of which 5000 are navigable; 11,000 lakes, and 2000 miles of Great Lakes' coast line.

Pollution of water injures water for many uses. Water must be considered in its relation to agriculture, fishing, pollution, floods, etc. Then there must be a listing of projects which will take care of the problems which these various considerations bring to light. This has already been done in Michigan. Already there are listed $128,000,000 worth of work of which about one third is concerned with water supply and two thirds with sewage treatment.

An act has been passed in Michigan to create a fund of $5,000,000 to aid municipalities in the planning of post war projects. These plans, or at least the requests, must be filed before Nov. 1 of this year.

Paying for Sewage Works

Emphasizing the fact that to expect the federal government to pay for local improvements was to put the cart before the horse, N. G. Damoose, Dir. of Public Service at Battle Creek, Mich., said that Battle Creek had already listed plans for $28,000,000 worth of needed public improvements, but had not yet planned how to obtain the money.

But Mr. Damoose has an idea. He suggests that the water and sewage departments borrow back and forth

Food —
For the Appetite *For Thought*

from unused surpluses in each or either department, without payment of interest. Such a plan is feasible *if* the two departments have the spending of their own funds within their control and *if* surplus funds in either department cannot be used for general municipal operations.

Mr. Damoose has shown where it would be possible to use the surplus of the one department to build a garbage reduction plant in Battle Creek with the payment of interest charges which would amount to as much as the original cost of the project. The project would be self-liquidating and the funds would be paid back to the water department before they will be needed. The proposition, however, was turned down by the voters.

This borrowing from one department for the use of the other has already proved feasible in one instance at a great saving to the city. It provides one means of paying for sewage works. Mr. Damoose also suggests that they expect to help defray operation expenses by selling digested sludge either dry or as a liquid plant food.

Smoker and Annual Banquet

A smoker and Dutch lunch was held at the Forty and Eight Chateau in Lansing on the first night of the conference. The program had been arranged by "Duke" Jackson, Paul "Bunyan" Stegeman, and George Wyllie. Sound motion pictures in color were shown through the courtesy of the Michigan Dept. of Conservation. Col. Arthur B. Morrill, recently returned from India, showed colored slides of his experiences in India and on the Burma Road. Col. Morrill leaves shortly for another year in the Orient.

At the annual banquet held at the Porter Hotel, the dinner address was made by Dr. Paul Honigsheim, Assoc. Prof. of Sociology, Michigan State College, who spoke interestingly on "National Problems in the Present Balkans."—G. E. S.

A Back-Washing Nozzle*

When attempting to wash the sediment from filter underdrains with a regular nozzle, most of it is driven ahead of the water steam to the rear of the underdrain, but with a back-washing nozzle the sediment is washed out with the water steam. A design for an easily constructed back-washing nozzle is shown in the accompanying sketch.

Procure an ordinary hose nozzle and cut off the bell at the spray nozzle until it is tapered as shown at "X"—that is, along dotted line "BB." Cut off the needle from the inner part of a nozzle as shown along the dotted line "AA." Drill a 5/64-in. hole in center of old needle and tap with a 10-24 tap. Insert the 1¾-in. x 10-24 screw into the tap hole so that threads project to the outer end of the nozzle.

Make a nose piece 1 in. in diameter and shaped as shown so as to deflect the water steam to the rear instead of forward. Drill and tap the nose piece and screw on to the projecting end of the screw. The size of the stream can be controlled as before by adjusting the nozzle ferrule.

In regard to using the back-washing nozzle, it is well to stay out of the way of the business end. When washing out underdrains, the operator holds his hand around the nozzle to break the spray until it is inserted into the drain, and also when it is withdrawn, he places his hand around it just before removing.

Suppose one desires to wash out a barrel or other closed container. Insert the back-washing nozzle and the whole interior can be flushed out. When one tries to wash out an underdrain, it is almost impossible to insert the hose very far on account of the reaction of the water stream, but with the back-washing nozzle, the reaction of the water tends to draw the nozzle into the drain and assists the user thereby.

When one has already used a regular hose nozzle for this job, he will be surprised how much additional sediment will be removed by the back-washing nozzle. He will decide that never before has he given the underdrain a real washing.

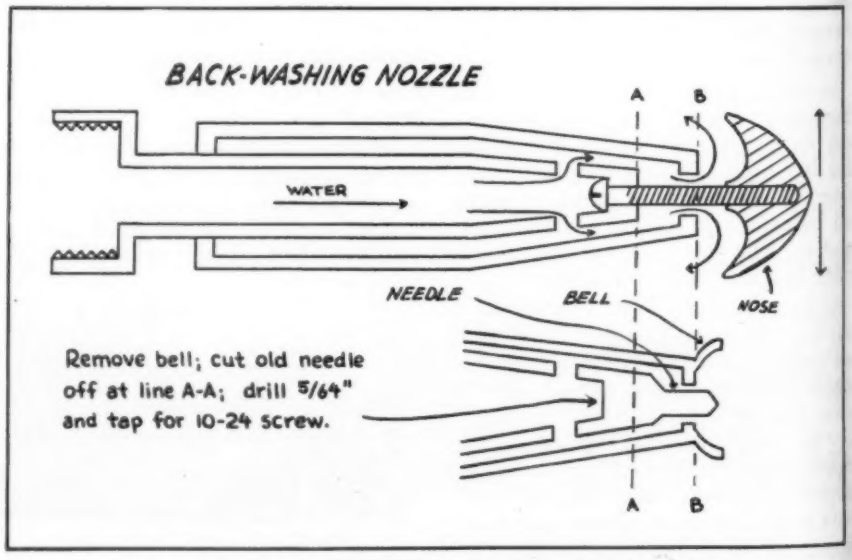
*Contributed by Basil Miller, Supt. of Utilities, Fenimore, Wis.

Mark Owen Heads ASCE Research and Development Division

Following nine months work by a committee of the American Society of Civil Engineers, a Research and Development Division was created to stimulate and assist local private interests and government units in completion of engineering and architectural plans looking toward post-war employment in the construction. Named to serve as full time director was Mark B. Owen of Hastings-on-Hudson, N. Y. Also named to act as executive director was Vincent B. Smith, Associate Editor of *Construction Methods.*

Mr. Owen's experience includes eight years as commissioner of public works and engineering at Dearborn, Mich., and seven years as manager of engineering sales for the Nichols Engr. and Res. Corp. He is a past president of the Amer. Pub. Works Association.

From their office at 330 W. 42nd St., New York City, the research staff will compile and issue comprehensive inventories for the guidance of engineers, public officials, architects, and industrialists.



Back-Washing Nozzle for Clearing Filter Underdrains

CORROSION OF DIGESTER HEATING COILS

Some Comments on the Carmel Problem

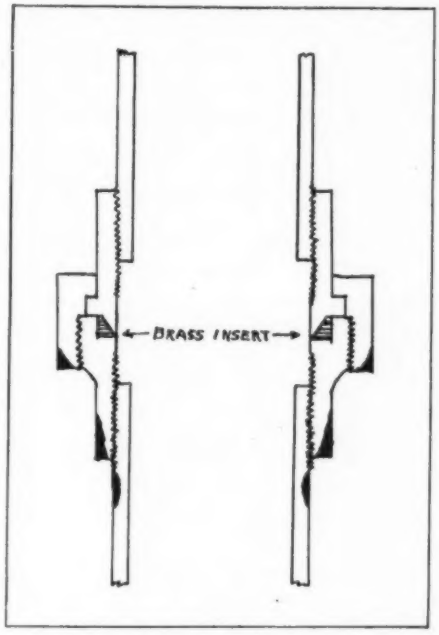
By RICHARD POMEROY*
PASADENA, CALIF.

REFERRING to the question about corrosion of digester heating coils asked by Mr. Rowntree in his note on page 421 of the November, 1943, issue of *Water Works and Sewerage*, I have the following comments:

A complete explanation of a case of this sort usually requires information not included in a brief recitation of the major features, and this case is no exception. However, certain observations may be made, the foremost being this: *The brass seats did not have anything to do with the reported corrosion* (see sketch). This statement may be made with considerable assurance because there is no conceivable way in which the brass surface could constitute an electrode in a circuit capable of causing corrosion as shown. Very little of the brass is exposed even to the heating water. None of it is in contact with the sludge or supernatant.

Corrosion of submerged metals is rarely uniformly distributed. If a piece of iron is exposed to water, and great care is taken to assure the maximum uniformity of metal and surface conditions over the entire exposed area, the corrosion will nevertheless distribute itself unevenly. Some portions of the surface will develop pits, while other areas will show no corrosion whatever. Once a pit starts, it becomes a self-perpetuating anodic area and confers cathodic protection on the surrounding metal. But the original pattern of anodic and cathodic areas may be determined by the most casual factors.

The localizing of the corrosion of the heating pipes in the places shown in the sketch may be due to quite trivial circumstances. The fact that three of the five pieces of iron were attacked makes it appear unlikely that metal differences were a determining factor. If these pipes were in a vertical position, then rising of gas bubbles, or of heated sludge, would cause a difference in conditions on the two sides of the coupling which could easily account for the localization. Sludge currents due to stirring or any other cause might also be a factor, especially in the case of horizontal pipes. Variations of stress in the metal also frequently determine the distribution of corrosion, though probably not in this case.



Cross Section of Union Revealing Points of Corrosion

Just as it is difficult to give a complete explanation of the causes without opportunity for personal examination, so also a discussion of what to do about it must of necessity be rather vague. In general, it may be said that corrosion in digesters is likely to be severe if the concentration of dissolved sulfides is high, and to be more severe at low than at high pH values. There is also some evidence to indicate that iron immersed in the sludge will not suffer appreciable corrosion if it is insulated from other structures; for an electrolytic circuit, involving reinforcing steel or other surfaces in an aerobic environment, may be a necessary factor.

The following possible remedies may be considered:

1. Determine the pH and dissolved sulfide content of the sludge. If dissolved sulfides are higher than 1 p.p.m. and the pH is below 7.1, consideration should be given to possible alterations of operation which would improve the condition of the sludge.

2. Insulation of the heating coils from metallic contact with any outside structures might be tried. This would include insulating couplings where the pipes enter the tanks. Of course, this would not afford any protection to other structures in the tank, but corrosion to the extent indicated, while serious for pipe, may not be serious for the manhole steps and mechanisms.

3. If the condition is serious enough to warrant it, cathodic protection may be used. An explanation of the application of cathodic protection to digestion tanks has been given by G. A. Parkes in his informative paper, "A Digester Corrosion Problem," to be found in the March, 1941, issue of *Water Works and Sewerage*.

[Ed. Note: This is the first of the comments invited on the Carmel heating coil corrosion problem. Other comments and ideas are invited.]

*Montgomery and Pomeroy, Engineers and Chemists, Pasadena, Cal.

Maj. Stanley Now Teaching at M. I. T.

William E. Stanley, on military leave from Cornell University for the past three years, has been placed on inactive duty status as of April 3, and has taken over the teaching of Professor Thomas Camp's Water Supply Courses at Massachusetts Institute of Technology. Professor Camp has resigned to devote his time to his consulting practice and Maj. Stanley has taken over for the current term ending about July 1.

When "Bill" Stanley left Cornell University he accepted a commission as Major in the Corps of Engineers at General Larkins' request to undertake a special mission as Water Supply Officer for the Central Task Force in the North African invasion of the Oran, Algeria area where water supply was a critical factor.

Following that assignment, Major Stanley went into the Tunisian Campaign as Water Supply Officer, thereafter becoming Chief, Construction Branch, Headquarters of Service of Supply, North African Theatre of Operation.

Professor Stanley expects to return to his duties at Cornell University at the beginning of the next school year about Nov. 1. No permanent successor to Professor Camp has been chosen as yet.

SEWERS

A Re-examination of Some of the Fundamentals of Design and Construction of Sewers

By CARROLL H. COBERLY
Consulting Engineer
DENVER, COLO.

FOR some time there has been lurking in the mind of the writer a question concerning the degree of attention given in the design and construction of sewers.

The science of Sanitary Engineering has advanced from a rather nebulous stage to the point where all engineers interested in the disposal of domestic and industrial wastes are looking for every means possible to improve the final results. It may be stretching a point by going back to the first step and attacking the sewer construction and maintenance problem as an important factor in the problem as part of the answer to economics of sewage disposal, but there appears a high probability that more consideration given to the sewer system will return many times its cost.

It is no longer sufficient to take a known grade and lay the sewers to that grade without giving consideration to other elements of the job. This article will merely touch the high points that have been brought home by experience, with the hope that it will promote discussion and the comparison of opinions from which may be developed a new conception of the importance of the subject of sewer design and construction and how to handle it correctly.

Loads on Sewers

Twenty-five years ago the maximum axle load passing over a sewer trench did not exceed 3 to 4 tons. Today, the load is 16 tons and is increasing all the time. This means that more consideration must be given to the trench width, to the foundation of the tile and to the lateral support given to the tile by the backfill. These greater loads are more apt to crush the tile and cause it to settle out of alignment. It is only common sense that this condition should be given considerable study. Much experimental work has been done along this line, and the data for correct design are readily available.

Infiltration and Sewer Design

Another factor that has caused a change in sewer construction is sewage treatment. Poor sewer design can materially injure a good sewage treatment plant. Infiltration dilutes the sewage and requires greater capacity in the settling tanks, trickling filters and other units of the plant. Septic action in the sewers causes dissemination of the sewage particles and increases the difficulty of disposal, as well as causing odors and disintegration of the concrete masonry structures. Septic action as used in this article means the process that changes the sewage from a fresh to a putrid condition. The process is active in the fresh sewage as well as in the putrid sewage.

Where there is infiltration into the sewers, the ground water level is lowered to the sewer level and benefits the adjacent houses. It is sometimes argued that sewers to be of maximum benefit should control the ground water level. It must be admitted this is correct. Where the contour of the ground admits, the water table can be controlled by the use of subdrains at intervals emptying into an adjacent water course or in some cases into storm sewers. It is doubtful whether it would be economically possible to construct a subdrain the full length of the sewers having a sufficient capacity to lower the water table below the sewer level.

From the property owner's point of view it is mandatory to deliver to him the maximum benefits. There is, then, a question of economics between an increased cost in the sewage disposal plant and cost of subdrains, and also whether the ground water level should be considered as part of sewer construction. Local conditions must govern the decision, but generally, infiltration should be eliminated as far as practical. The only means of elimination is to construct tight sewers.

Joints and Infiltration

One advance has been made in the matter of infiltration by the use of bituminous joint compounds. While there are some records that indicate that asphalt disintegrates in water, there are other records covering many years' use, showing that asphalt does not disintegrate. One city replaced a fifteen-inch sewer that had been badly crushed after twenty-three years of service and found that the joints constructed of poured asphalt were all in good shape. After considerable correspondence with different localities, the writer is of the opinion that plastic sewer joint compound made out of lake asphalt rather than petroleum asphalt has a very long life. Undoubtedly the extra cost of asphalt joints is well justified.

A rigid joint compound such as cement will not allow the pipe to settle without cracking. One line using cement joints, replaced by the writer, was found to have a great many cracks in the bells and the infiltration was occurring through these cracks rather than through the joints themselves. There is no doubt but that a tight joint can be made with cement. If there is no settlement, there will be no leakage. Experience seems to show that after two or three years' time, infiltration increases, indicating cracked bells or joints due to settlement. Joints of plastic asphaltic or bituminous compounds give with settlement so that there is little danger of cracking the bells, and the increase of leakage after a few years is reduced to a minimum.

Manholes are also a prolific source of infiltration. This point, however, can be easily overcome by more rigid inspection in seeing that water-tight concrete is poured for the base and that the outside of the manhole is well plastered with a good cement plaster.

Volume of Sewage Flow

Comparing records of sewage flow, using the records of many different cities, indicates that 100 gallons per capita is about the logical amount to be expected. There seems to be a question as to whether or not this amount is partly infiltration. In adding up the amount of flow that can reasonably be expected per capita (one bath a day at 20 gallons, 8 flushings of a toilet at 24 gallons and 6 gallons per day for cooking and washing, making a total of 50 gallons per capita), it would rather seem that this is a fairly liberal allowance for actual use, not including industrial flows or high consumption with flat water rates. In a measure this assumption is borne out in an article by Kessler in the Sewage Works Journal where he gave, in certain Army camps, a per capita

flow of 50 gallons per day. The thought is not to establish a new data on which to base design, but rather to show that it is very possible to reduce the present per capita flow, as generally accepted, by building tight sewers.

Stranding of Solids

When sewage solids are deposited out of the flow, septic action immediately commences. Rudolfs has shown that for one sewage, the B.O.D. increases from 163 to 172 p.p.m. in two hours, and suspended solids reduce from 230 to 227 p.p.m., while in 48 hours the 5-day B.O.D. increases from 163 to 254 p.p.m. and suspended solids reduce from 230 to 104 p.p.m. This septic action causes dissemination of the sewage particles or the breaking down of the sewage solids into smaller particles. Any detention of the solids in the sewers increases the time to reach the plant and subjects them to septic action during this interval. There are a number of causes of deposition that are not permanent blocks and when flow conditions change, these deposits are moved down the sewer. This increases the time it takes for the sewage to reach the plant, increases the 5-day B.O.D. and reduces the amount of suspended solids. At the same time the chlorine demand of the sewage increases.

The first place to look for deposits is in the manhole. If the channel through the manhole is not deep enough to carry the flow, solids will be deposited on the shelf. Sewers are generally calculated to flow half full at the average peak load. At the peak load the flow may be considerably above the half full mark. If the channel is only constructed as half tile, the peaks will flow out on the manhole shelf and deposits of solids will occur.

Another cause of flow going out over the manhole shelf is a change from a steep gradient to a flat gradient. A hydraulic jump occurs at this point which may be great enough at times to flow over the shelf of the manhole. Where side sewers with a steep gradient enter a trunk line built on a flat gradient, there will also be a hydraulic jump. The turbulence caused by an outside drop manhole will generally produce the same condition, unless the drop is so designed that the excess energy will be dispersed before reaching the main line. The remedy for these conditions is a deeper channel through the manhole and a greater slope to the manhole shelf.

In many locations it is necessary to lay the sewer on as flat a grade as possible. Ordinarily, calculations are made using a velocity of two feet per second and a friction factor of "n" equals 0.013 with the sewer running half full. During low flows, this velocity drops very materially below two feet per second, with the result that a certain amount of deposition occurs. When a side sewer enters a flat line of this kind, the water level at this point is increased and the gradient of the sewer above is decreased. If the side sewer has a steep gradient, a hydraulic jump will be created in the manhole, and in this case the gradient in the flat line above the manhole will be further decreased and the gradient below the manhole in the flat line will be increased. The hydraulic jump should be calculated, and even though there is a loss of head, these two heads should be added to the gradient of the pipe. Otherwise deposition extending over periods long enough to cause considerable deterioration will occur.

Size of Sewer Pipe

At the ends of the line another condition exists. The greatest flow out of a house occurs at the time of flushing a toilet. A modern toilet flushes at the rate of about eighteen gallons per minute. The flow lasting about nine seconds. This eighteen gallons a minute rate is the maximum single item of flow of the sewer at the end of the line. It can be shown mathematically that in a completely built-up block of twenty-four houses, two toilets will only be flushed at the same time once every three or four days; there will be, of course, a certain amount of flow from other fixtures. Thus the flow from a completely built-up block will be eighteen gallons a minute plus 3 or 4 gallons from other fixtures not to exceed 25 gallons per minute. This is the maximum rate of flow with long periods of practically no flow.

A six inch pipe laid on a minimum grade of .63 per cent will carry about ninety gallons per minute flowing half-full. This means that in a completely built-up block the sewage flowing at a maximum rate has a depth of approximately 1/5th the pipe diameter. At this depth the velocity will not exceed one foot per second or one-half of the calculated velocity. As a result of this condition solids will settle out and block the sewer until a *sufficient* head is built behind them to move them further down.

It has been customary in the past, in order to gain depth, to lay a larger sewer on a flatter grade. If the sewer flows half full or better, this principle is sound, but it can be shown that with a six inch sewer and an eight inch sewer laid at the same grade the velocity in the two sewers is identical, when the flow decreases to a certain point; but, when the flow is decreased below this point the velocity in the six inch sewer will be greater than the velocity in the eight inch sewer.

There has been considerable research done on the value of Kutters "n." This research apparently has established the fact that it increases with a decrease in the depth of flow. This fact would further increase the difference above mentioned in velocity between an eight inch sewer and a six inch sewer. At low flows it is very evident that extreme care should be used in increasing the size of the pipe and flattening the grade in order to gain depth. At the ends of the line it is impossible to use a larger pipe and flatten the grade without causing serious trouble.

It is easier to clean an eight inch sewer than a six inch sewer. The difference in construction cost between an eight inch and a six inch sewer is so little that the engineer, ordinarily, feels that he is increasing the efficiency of the system by installing the larger size. There is a tendency not to use less than an eight inch pipe. It seems to the writer that this is fallacious reasoning and that actually a better job will be had in the upper three or four blocks by using a six inch pipe than an eight inch.

In order to provide for the future, sewers greater in capacity than present demand calls for are installed. The difference in cost between a given size sewer and the next larger size is so little that it is felt to be economical to use the larger size. This applies to the system at all points. It can be definitely stated that a smaller size will give better results as far as deposition is concerned than the larger size. While the larger size may be necessary, great care should be exercised, and the larger size installed only where it is absolutely necessary. Generally a system can be designed to have interceptor lines which would be installed at some future date. These interceptors would cut through the system of collector lines, doubling the capacity at only a small capital outlay. This means the initial cost can be held to a minimum and the flow conditions very materially improved during the time that the location is not completely built up.

Flushers and Lift Pumps

Flushers at the ends of lines have largely been discarded because of the stoppage of the charging valve. The

valve will become stopped due to scale or corrosion and then the flushers will not work, or if the valve is opened up enough to keep the flushers working, it uses too much water. Certainly a flusher at the end of the lines flushing once or twice daily will keep the sewers in much better condition. With the advent of glass orifices this difficulty has been largely overcome, and the prejudice against flushers is no longer entirely justified. Frequent inspection is of vital importance. Flushers should be inspected at least once a month.

Small lift pumps have been developed to a point where the cost of construction and the cost of operation is no longer an important item. The trouble with stoppage has been largely overcome so that these small units require little supervision. By the use of small lift stations, the grade of the sewers can be maintained and excessive cuts can be avoided with a resulting increase in efficiency and a decrease in construction cost. Certainly there are many cases where the economics and increased efficiency warrant their use.

Recommendations

It is the contention of the writer that sewage disposal *begins in the sewer*. Therefore, to increase the efficiency of the sewer system by means of better flow conditions is to increase the efficiency and economy of operation of the disposal plant. It is sometimes possible to materially decrease the cost of a disposal plant by making rather minor corrections in the sewer system. Careful calculations should be made on all of these items mentioned before, so that septic action and infiltration will be reduced to a minimum. Rigid inspection by competent inspectors during construction will minimize the possibility of many of the problems considered. Above all, sewers should be carefully inspected several times a year; this means opening every manhole in the system, and whenever there is evidence of bad conditions, the sewers should at least be flushed and possibly rodded, using a good stiff brush that will thoroughly loosen any deposits or growths that have formed.

Northeastern Changes to Shorter, More Inclusive Name

Northeastern Water and Electric Service Corporation with properties in a number of states as far south as Arkansas, west to Illinois and northeast to Maine, has changed its name to the shorter and more inclusive name, Water Utilities Service Corporation.

The general offices of the Corporation remain at 21 West St., New York 6, N. Y., and no changes have been made or are contemplated in the officials or operating personnel of the Corporation.

This announcement was made March 31st by Boyd A. Bennett, President of Water Utilities Service Corporation.

Waterworks Engineering in Disaster

"WATERWORKS Engineering in Disaster" is a technical manual, OCD publication 2,022, recently released by the Office of Civilian Defense. Prepared under the direction of G. E. McCallum, formerly Chief Sanitary Engineer of the Office of Civilian Defense, the book is for the use of waterworks and public health engineers in connection with emergency waterworks problems. Originally prepared for use in event of a wartime disaster, it is applicable to any serious difficulty or natural disaster during peacetime, and as such the book should be a valued reference. Replete with pictures and diagrams illustrating the text, and appendices giving methods of analyses of water and analyses of distribution systems, the book contains a wealth of text material.

Essential problems of emergency operation are considered, particularly those involving increasing available plant capacity, safeguarding the quality of water in the distribution system. Maintenance of all parts of the system including supply, pumps, motors, etc., is given ample discussion, as is the importance of accurate, up to date maps and records, operation control, and repair of the distribution system. Equipment for locating pipes and detecting leaks are described, and one chapter considers the effect of valve shut-off on water service. Causes of contamination of water supply are thoroughly discussed, as are procedures for disinfecting contaminated water mains and plumbing systems. The importance of an adequate water supply and the protection of a community against fire are presented with abstracts from the National Board of Fire Underwriters for evaluating the adequacy of a water supply for fire protection.

Another chapter describes the method of studying the hydraulic performance of distribution systems, while another presents material on wartime laboratory control prepared by a committee of consultants. This latter chapter, together with another one on waterworks plant protection, will probably have little use after the war is over, but the remaining sections of the book are useful in the case of any type of emergency waterworks operation.

The appendices contain material on improvised solution feeders, determination of residual chlorine, discharge measurements for main disinfection, analysis of compound and equivalent pipes, circle method of analysis, the Hardy Cross analysis of distribution systems with the aid of the Shand Nomograph, determination of coefficient of friction from incremental flow measurements, and procedures for chlorine demand test.

This 147-page book may be obtained without charge from the Office of Civilian Defense, Washington 25, D. C.—G. E. S.

Water Conservation Par-Excellent

Julie: Wher'd you ever get the idea, Jo?

Jo: Well, I've been reading a book on how to conserve water in wartime, published by the American Water Works Association, but this is an idea that they overlooked.

(For this cartoon we are indebted to Liberty magazine)

A Sludge Level Sounding Chain

By A. A. HIRSCH
State Department of Education
BATON ROUGE, LA.

As Imhoff tanks are generally not provided with sampling cocks that are standard equipment on separate sludge digesters, sludge level is located either by means of a pitcher pump with variable depth suction hose or by a weighted plate suspended on the end of a chain. When using the conventional float loaded with a small window weight, the length of chain paid out is noted when the buoyant effect of the sludge is first felt. On slight penetration of the sludge layer, usually gases are released and bubbling increases locally.

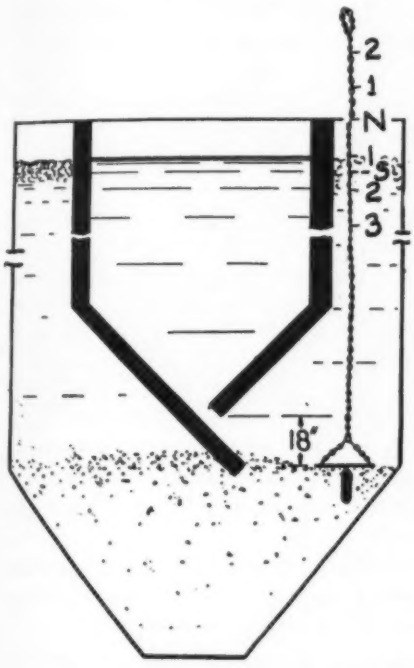


Fig. 1—Sounding Chain in Position in Imhoff Tank

Instead of measuring depth to sludge with a tape laid on the chain, much time may be saved by marking the links directly with metal tags or rivets, stenciled with proper figures. Ordinarily the operator is interested in the distance down from the slot level to the sludge surface so as to judge the possibility of gas bubbles rising in the settling compartment and interfering with sedimentation. Normally a neutral zone of not less than 18 in. is maintained between the plane of the slot and the sludge level. The chain described below was marked so that by merely noting the tagged position relative to the top of the tank or some other convenient data, the sludge level is read directly.

In the figures 1 and 2 the sounding chain is first marked with a bolt or rivet having the letter N stenciled on its head, to correspond to the bottom of the neutral zone. The tag lettered S marks the slot depth. At 1-foot intervals, both above and below the neutral zone mark, are placed numbered tags as shown; so that the operator may determine the sludge level immediately from the chain marks coincident with the top of the tank. This same scheme is applicable to mark off sludge depths on the rubber suction hose of a pitcher pump with paint. From a series of readings around the tank, a decision may be quickly reached whether further accumulation of sludge or withdrawal is desirable. A chain of the type described is being used with satisfaction at the Abbeville, La., sewage disposal plant.

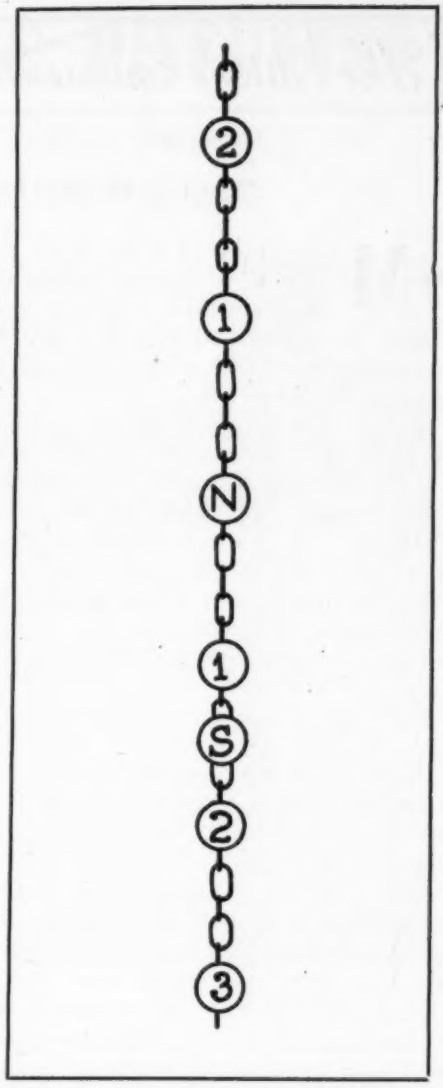


Fig. 2—Detail of Sounding Chain

British Govt. Contemplating National Water and Sewage Systems

The British Ministry of Health is planning the first national water scheme, to embrace the water resources, the use of these and their application to improved public health ever to be introduced in this country. The scheme also involves the sewerage systems of the country, which have, like the water systems, been largely in the hands of municipalities and local communities.

A new bill which is to be introduced into Parliament soon will deal with rural water throughout Great Britain and with sewerage. At present most rural communities are at a very great disadvantage in that the cost of efficient modern water schemes and sewerage schemes is beyond all possibility of repayment by local rates. This new bill aims at a vast extension of pipe supplies to suburban and rural areas, this being regarded as the most vital short term need in Britain. The bill also indicates that more attention is being given to planning for the future—by the accurate measurement of resources, the improvement of existing water supplies, a more vigorous national central initiative, and the equalization of charges over wider areas.

These decisions follow criticism by some members of Parliament that our supplies in some local areas are worse than in Central Africa, an obvious exaggeration in view of the Government reply that 95 per cent of the British population have pipeline supplies, and that our deaths from typhoid are the lowest in the world.

The undoubted scope will involve some amalgamation of the many local units into more centralized, more embracing, and more efficient systems, as against the small town locality basis of developing, financing and operating individual separate systems. —Robie Walker.

The Editor's Comments

Muddy Waters!

"MUDDY waters 'roun' 'mah' feet." The plaintive call of the darky along the river. "River stay 'way from 'mah' 'do'." "Muddy Waters" makes a fine song, but that thought, "River Stay 'Way From My Door" expresses the heartbreak of thousands of people each year.

Floods are something that happen to someone else. Someone who lives on the river bottom and won't move because they are too poor or love the good, black, fertile silt too much. But floods happen to other persons: To farmers of the great plains of the Mississippi, to soldiers, to city dwellers, and to water works operators. This year has been no exception, and the floods are here again, although the destruction, loss of life, and crippling of normal operations has not yet been as great as in 1937 or last year.

Newspaper reporters find human interest stories in the efforts of an indivdual farmer to fight back the onrush of the dark, swirling waters but they generally overlook as great a story in the heroic efforts of water plant engineers and superintendents to resist or tame those muddy waters.

This year the Indiana Section arranged a symposium on the flood experiences of 1943, only to find that several of the scheduled participants were held at home battling the *1944* floods, to prevent water plants from being put out of commission as they were last year.

The story of these unsung heroes is told in the report on the Indiana Section meeting elsewhere in this issue. It is inadequate. Inadequate to do justice to the story of sweat, strain, sleepless hours, and ceaseless struggle to protect the system as flood waters climb slowly with devilish cunning. Climbing, lapping at the sand bags on the levee as fast as they are laid, rushing with full force of flood tide over barricades that crack like puny matchboxes when hit by the crushing wall of water.

While floods have been used for military purposes to good effect in this war we mostly remember the devastation, the havoc and the heartbreak caused by swollen streams. We remember when the swirling, boiling, clay laden waters of the little North Fork River in Illinois, vaulted over the sand bag levees and flowed into the water plant.

Gradually rising, higher and higher the ash pits of the furnaces were filled. Higher and higher,—Now the fire on the back end of the sloping grates was hissing and turning black, while the fireman stood knee deep in water and shovelled coal into the front of the furnace.

Meanwhile the fly-wheel of the big pumping engine ran in four feet of water throwing a beautiful geometrical pattern to the ceiling. Pretty, but awesome. What if it stopped? Thousands of persons without water. No fire protection. Possible epidemics.

As those ashes hissed with the water lapping the furnace fires, there was but one thought. "Keep It Going!" Muddy waters mean more to the water plant than just keeping it going. They often mean back-breaking work of handling enough alum or other chemicals to turn a coffee colored slurry into a clear and sparkling drink, or struggling to keep a residual chlorine content to protect the consumers. Those muddy waters often tax the ingenuity of the operator as much as they do the design and capacity of the plant. Our hat is off in tribute to the water works men who battle floods.—(G.E.S.).

Spring Cleaning Time

IN HIS editorial, "Muddy Waters," Dr. Symons did not make any reference to the aftermath of a flooded plant—that noisome task of cleaning up the mud, muck and slime that is deposited everywhere and left by the receding waters. It is a sticky coating found everywhere, and on everything, and a miserable job it is to remove. What isn't removed dries into a tenacious coating and, underfoot, turns into an impalpable dust which defies clean sweeping.

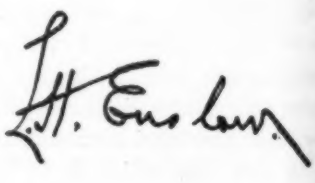
These thoughts of cleaning up, and the robin and the thrush that sang in our yard this evening, bring to mind that spring is here again and the looks of our garden says it's clean-up time again. Yes, it's time for the spring-cleaning up here in the North and it has been for some time in other parts of the country.

There are no priorities on spring-cleaning and this is something that can be done with profit at most water and sewage plants. In the office a good spring-cleaning should yield much waste paper that is this year so sorely needed to combat the paper shortage. In the plant and yard considerable metal is still to be found which may be put to good use as scrap. At the same time there is no inspection which will uncover needed repairs and replacements as effectively as will a thorough spring-cleaning.

Nothing is more conducive to efficient operation than a clean plant, unless it be one which, in addition to being clean, is also touched up with shining new paint.

Now, this last statement brings to memory some recent observations. The writer has seen more rust and rust stains at plants recently than in a long time. It is mute evidence of the fact that maintenance has suffered, as we all know that it has. But, it is doubtful that it has been necessary to neglect painting to the extent that it has been in many places. Some plants have begun to look a bit worn down at the heel and this should be corrected. Concern over deferred maintenance for so long a time has been expressed on this page in earlier issues. In fact, the Office of War Utilities of W.P.B. has also expressed concern over this situation.

So, we say that spring-cleaning time is here again and that nothing can more effectively produce an inventory of minor repairs and replacements needed than a thorough spring-cleaning.



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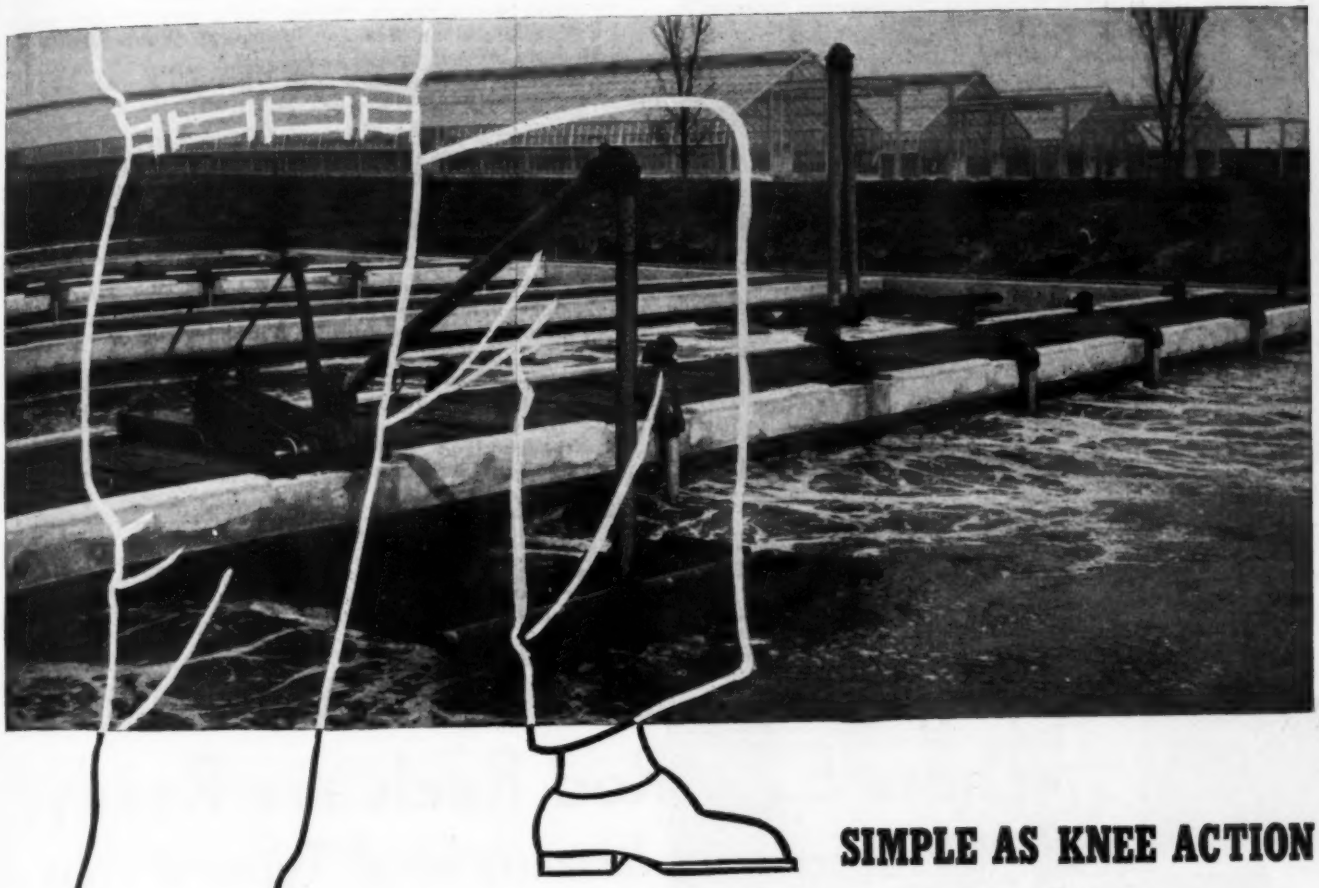

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MEETINGS SCHEDULED:

May 18—DURHAM, N. H. (New Hampshire University).
New England Water Works Association. Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

May 18-19—COLUMBUS, OHIO (Hotels Fort Hayes & Chittenden).
Ohio Section A.W.W.A, Sec'y-Treas., L. J. Hoffman, City Water Works, 100 Municipal Bldg., Akron, Ohio.

May 19-20—BALTIMORE, MD. (Lord Baltimore Hotel).
Maryland-Delaware Water & Sewerage Association. Sec'y-Treas., E. V. Gipe, 2411 N. Charles St., Baltimore, Md.

May 22-23—HERSHEY, PA. (Community Bldg.).
Penna. Water Works Operators' Assn. (Annual Conference). Sec'y-Treas., I. M. Glace, 22 South 22nd St., Harrisburg, Pa.

June 13-16—MILWAUKEE, WIS. (Hotel Schroeder).
American Water Works Associaton
(1944 Wartime Conference and Annual Meeting.)
Exec. Sec'y, Harry E. Jordan,
500 Fifth Ave., New York, N. Y.
(Because of the hotel situation it is essential that all future requests for hotel accommodations be addressed to—Convention Bureau, Association of Commerce, 611 No. Broadway, Milwaukee (2), Wis Accommodations in one or another Milwaukee hotel are obtainable through the Ass'n of Commerce.)

June 14—KENNEBUNK, ME.
Maine Water Works Association. (Regular Meeting.) Sec'y-Treas., Earle A. Tarr, Winthrop, Me.

June 16-17—SYRACUSE, N. Y. (Hotel Syracuse).
N. Y. State Sewage Works Association. Sec'y, A. S. Bedell, N. Y. State Dept. of Health, Albany, N. Y.

June 21-22—MARION, OHIO (Hotel Harding).
Ohio Conf. on Sewage Treatment. Sec'y-Treas., D. D. Heffelfinger, 1101 N. Walnut St., Alliance, Ohio.

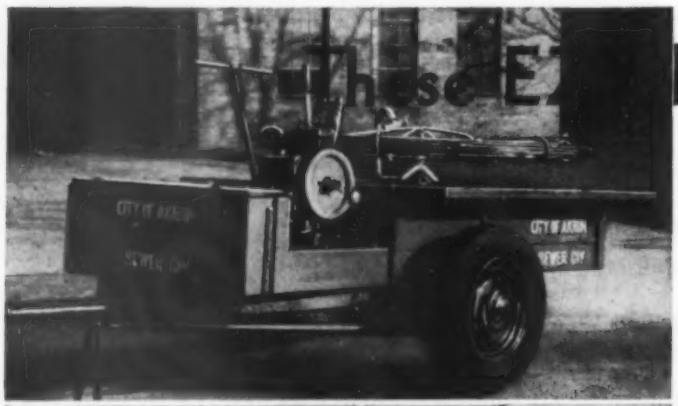
June 22-24—OSHKOSH, WIS. (Hotel Rault).
Central States Sewage Works Ass'n. Sec'y-Treas., John C. Mackin, Supt. Sewage Treatment Works, Route 4, Madison, Wis.
(Meeting in conjunction with Wisconsin Sewage Works Operators' Conference.)

Aug. 29—COLUMBIA, PA. (Columbia Water Company).
Penna. Water Works Operators' Assn. (Eastern Section). Sec'y-Treas., I. M. Glace, 22 South 22nd St., Harrisburg, Pa.

Sept. 13-14—PITTSBURGH, PA. (Roosevelt Hotel).
Western Penna. Section A.W.W.A. Sec'y-Treas., E. P. Johnson, 418 Flannery Bldg., Pittsburgh, Pa.

Sept. 19-22—POLAND SPRING, ME. (Poland Spring House).
New England Water Works Association. (Annual Meeting.) Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

Sept. 24-27—ST. PAUL MINN. (Hotel St. Paul).
American Public Works Congress. (Annual Meeting). Executive Director, Frederic Bass, 1313 East 60th St., Chicago, Ill.



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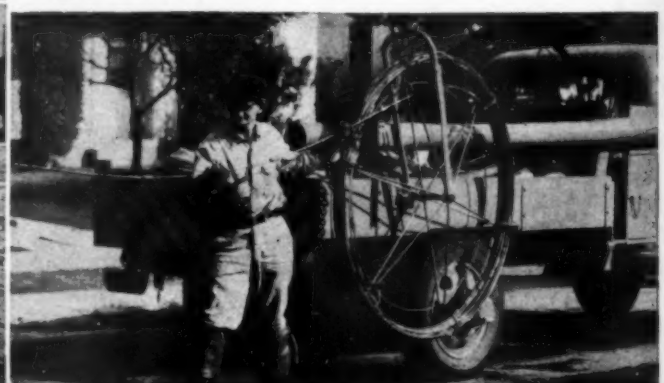

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Oct. 3-5—NEW YORK, N. Y. (Hotel Pennsylvania).
American Public Health Association. (2nd Wartime Conference.) Chairman, Reginald M. Atwater, M.D., 1790 Broadway, New York, N. Y.

Oct. 12-14—PITTSBURGH, PA. (Hotel William Penn).
Federation of Sewage Works Associations, Exec. Sec'y, W. H. Wisely, Illinois Building, Champaign, Ill.

Oct. 12-14—PITTSBURGH, PA. (Hotel William Penn).
Penna. Sewage Works Association. Sec'y-Treas., Bernard S. Bush, Kirby Health Center, Wilkes-Barre, Pa. (Joint Meeting with Fed. Sew. Wks. Assns.)

Oct. 17-19—AUSTIN, TEXAS (Hotels Austin & Driskill).
Southwest Section A.W.W.A. Sec'y-Treas., George J. Rohan, P. O. Dr. 449, Waco, Texas.

Oct. 23-24—KANSAS CITY, MO. (President Hotel).
Missouri Valley Section A.W.W.A. Sec'y-Treas., E. L. Waterman, 104 Engineering Hall, University of Iowa, Iowa City, Ia.

Oct. 30-31—PITTSBURGH, PA. (Hotel William Penn).
Engineers' Society of Western Pennsylvania. Chairman, H. M. Olson, Hotel William Penn, Pittsburgh, Pa.

Nov. 2-4—ATLANTIC CITY, N. J.
New Jersey Section A.W.W.A. Sec'y, C. B. Tygert, Dist. Mgr., Wallace & Tiernan, Inc., Box 178, Newark, N. J.

Nov. 8-10 — PHILADELPHIA, PA. (Benjamin Franklin Hotel).
Four States Section A.W.W.A. Sec'y-Treas., H. Lloyd Nelson, U. S. Pipe & Foundry Co., Broad and Chestnut Sts., Philadelphia, Pa.
and
Penna. Water Works Operators' Assn. Sec'-Treas., I. M. Glace, 22 South 22nd St., Philadelphia, Pa. (Second Joint Wartime Conference.)

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Single valve control makes operation easier, permits quick and exact adjustments to meet changing conditions.

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Here and There with Doc Symons

Martin Symons—A Tribute

DURING the past several years, a great many men have asked me, "Are you any relation to Martin Symons of the water plant at Danville, Ill.?," to which my proud reply was, "He is my father." From now on it will be "He was my father" for Martin passed away in the early morning of May 2nd.

Born in 1865 in a little Indiana town, Martin Symons spent almost

Martin V. M.
Symons
1865-1944

his whole life in making machines work for man. At the age of nine he fired his first boiler, at twelve he was operating a mill, and in the next several years he learned the millwright's trade. Before he was twenty Martin built the first A-frame dam west of the Allegheny mountains. The first Indiana turnpike was put down under his supervision and then he turned to strawboard mills.

It was 1895 when Martin Symons joined the water works fraternity as an engineer in the water plant at Danville, Ill. Except for a period of four years when he was Chief Engineer of a large power plant, he remained there until his death, and was Chief Engineer for the last thirty-five years.

To those who knew Martin, as he was called by all of us who had ever worked for him, this sketchy outline of his life is not the story of the man.

The story lies in the plant he leaves behind. Less than a year ago, Martin remarked, "This is the third time I've built this plant over." Quite true, for when he went into the plant two pumps of about 2 mgd. capacity supplied an untreated river water to a relatively few consumers who let the mud settle in the glass before drinking. Martin installed one of the first mechanical Jewell rapid sand filters, new and larger pumps, coagulation, first with lime and "iron" then alum. Hypochlorite was adopted about 1910 and one of the first silver diaphragm Wallace and Tiernan chlorinators went into service about time of World War I.

Four different dams, more pumps (one being installed now), new and larger boilers, a laboratory, all grew with Martin as he rode abreast of the onward sweep of knowledge about water treatment. Chlor-amination, activated carbon, and now breakpoint chlorination have all been adopted at the Danville plant. Dean of the water works operators in Illinois, Martin had seen the growth and development of modern water purification and, though without benefit of formal education, he learned modern techniques almost as fast as they were introduced.

Martin Symons had belonged to AWWA since 1915, and though he never aspired to office he was active in meetings both in the Illinois Section and the Illinois Filter Operators Association. He attended his last meeting of the Illinois Section but a month ago at Peoria.

Legend has it that Martin could look at a water and tell how much alum to add. Certainly he could look at a floc and know whether to add more or less chemical, and his comments at section meetings could be counted on to tell what actually happened in a given situation "without a lot of folderol theory." He loved to chide the professors and one famous chemist who invented a turbidimeter (one of which Martin built for his own use), will remember that Martin told him he didn't know anything about turbidity and wouldn't until he, like Martin, had handled turbidities of 24,000 ppm.

Martin Symons leaves few published articles and yet his plant is full of improvements resulting from laboratory or plant experimentation. He built model filters, used clay to remove color, poured water on his coal to make it burn better; for, in addition to operating a filter plant he was a combustion and steam engineer, operating several large boilers and steam driven pumps.

Two hobbies engrossed my father;

THE city of Buffalo, long progressive in many respects, has joined the ever-increasing number of cities and towns which are contributing substantially to increased food production in their respective areas by making fertilizer of their sewage sludge, instead of burying or incinerating it.

The Royer Model "NSH" Sewage Sludge Disintegrator pictured above, one of twelve models, is employed at Buffalo's main sewage plant where it converts the sewage sludge from a large population into a valuable and highly desirable fertilizer—a much needed aid to the growth of greater food crops and better lawns.

Scarcity of manpower need not deter you from making the fertilizing value in *your* sewage sludge available to the nation's food raisers. The Royer definitely saves man-power by eliminating the labor involved in burning or burying sludge.

The Royer breaks up, shreds, aerates and further dries the sludge and eliminates sticks, stones and trash. It discharges onto pile or truck an effective and ready-to-use fertilizer. Chemicals may be added, in the same process, to make a high strength fertilizer which, users report, sells at a greater margin of profit.

With the current strong demand for fertilizer, the Royer soon pays for itself at a sewage disposal plant.

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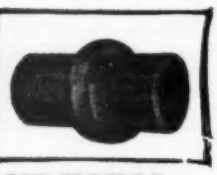

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- Form confines cement-grout to lower portion of joint.
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L. A. WESTON Adams, Mass.

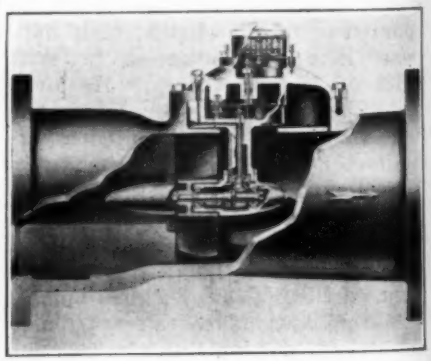
he was an official weather observer for 20 years, and he was an active Mason having received the thirty-third degree a number of years ago. He leaves besides his widow, two daughters, and his son, a host of friends, *and* one water plant endowed with his philosophy of "It's got to go." To him service to his community meant serving pure water at all times regardless of the problems of treatment involved, the mechanical difficulties which beset one, or the personal sacrifice necessary to keep the plant running.

I can think of no greater tribute to Martin Symons than to say, "He was a Water Works Operator's Operator."

MANUFACTURERS' *and* EQUIPMENT News

New Propeller Type Meter Announced by Builder

Builders-Providence, Inc., division of Builders Iron Foundry, long famous in the flow measurement field, has just announced a new propeller type flow meter for main line metering. For this unit, called a "Propeloflo" Meter, the manufacturer claims



many improvements, amongst which is its streamline Venturi construction and 8-blade Bakelite propeller moulded in one piece. Rotation is transmitted through spur and bevel gears. Shafts rotating in ball bearings assure maximum power to drive indicating and recording devices or proportioning chemical feeders. Particular stress is laid on the Venturi

throat which evenly distributes the force of the flow against the full area of the propeller, resulting in improved accuracy throughout an exceptionally wide range of flow. The possibility of spiral flow is eliminated by straightening vanes just upstream of the propeller.

The propeller hub, bracket and nose are streamlined to reduce flow disturbance and divert fine grit, sand or scale away from the mechanism. Engineers will find the unit easy to service, it is said, owing to its "one-shot" lubrication system, the readily accessible stuffing box, and the ease with which the propeller mechanism may be removed from the line for inspection. A blank cover may be installed when the metering element is removed. Wherever debris or heavy foreign material may be carried along the line with the moving fluid Builders recommends and can furnish a section of pipe having a coarse screen and hand hole, to be inserted upstream from the meter. Builders "Propeloflo" Meter, Model PRF, is a precision-made instrument providing . . . at low price . . . wide range, accuracy and low pressure loss in the measurement of liquid flow in lines 6 inch and larger.

For further information on this interesting development write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I. (Better still, visit their booth at the AWWA Conference in Milwaukee, June 13-16, where this development will be news. —Ed.)

"Bestolife" An Improved Joint Compound

Ever make up a threaded pipe or fitting joint and have it drip? Ever try to unscrew an old joint and scuff away half the coupling or fitting with a stillson just because of seized threads? If you have you will be interested in "Bestolife" joint making anti-seize compounds developed by I. H. Grancell of Los Angeles.

The "Bestolife" compounds obtain their distinctive lubricating and anti-corrosion sealing characteristics from the metallic lead base of the two compounds. One is for water lines and the other which is non-soluble in oil, gasoline, etc., is for oil, gas and gasoline lines.

Of considerable interest is the inventor's recommendation that the lubricating "Bestolife" be used on all threaded connections in valves, hydrants, pumps, engines, air compressors, etc.—particularly as a packing lubricant and on all studs and bolts. It is also recommended as a wire rope lubricant and a polishing compound

GET IN THERE AND START PITCHING
Team-work on the part of local planning and governing bodies is NEEDED NOW. You'll be asked to go to bat, one of these days, to provide much-needed work for the boys when they return. Millions of dollars of deferred water and sewage works maintenance, rehabilitation, expansion, and other needed local public works must be in contract-form . . . READY FOR IMMEDIATE ACTION. Don't get caught off-base by red-tape delays that can be avoided with a little team-work now.
We join the Committee on Water and Sewage Works Development in urging you, for the welfare of your community and the Nation at large, to determine tomorrow's needs, and to BLUE-PRINT NOW!
BLUEPRINT NOW
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MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

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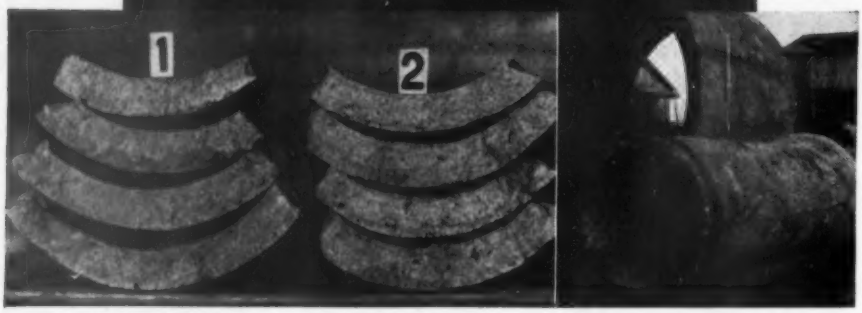
PHIPPS & BIRD, INC. Richmond, Va.

Many long service records prove the durability of CONCRETE PIPE



ST. PAUL, MINN.—Test specimens of concrete pipe sanitary sewer in excellent condition after 45 years.

SAVANNAH, GA.—Concrete pipe sanitary sewer installed in 1870; condition excellent at inspection after more than half a century.

For more than 100 years concrete pipe has been used for sanitary, combined and storm sewers.

The concrete pipe pictured here have service records up to half a century and more. The sewers of which they are a part were found on inspection to be in excellent condition.

The durability of concrete pipe is a natural result of its great strength and resistance to abrasion. But besides durability, concrete pipe lines offer the service advantages of smooth interior surface and evenly finished watertight joints which insure maximum hydraulic capacity, minimum infiltration and leakage.

Concrete pipe sewers, properly designed and installed under the supervision of competent engineers, will give many decades of service at low annual cost.

Latest technical information on concrete pipe lines for sewerage, drainage or water supply is available to engineers and officials now planning postwar construction.

PORTLAND CEMENT ASSOCIATION

Dept. 5-29, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS

for finishing piston rods, shafts and the like.

The economy in the use of "Bestolife" rather than other materials is found in the fact that about 66 per cent less "Bestolife" is required. Interestingly, "Bestolife" retains its lubricating and thin spreading qualities even when long exposed to air or water and a container can be left open without loss of its original qualities. It is excellent for air and steam lines as well as gas, oil and water lines.

As a packing lubricant and seal on sewage pumps it should have worth while advantages in keeping destructive grit out of the packing and bearings.

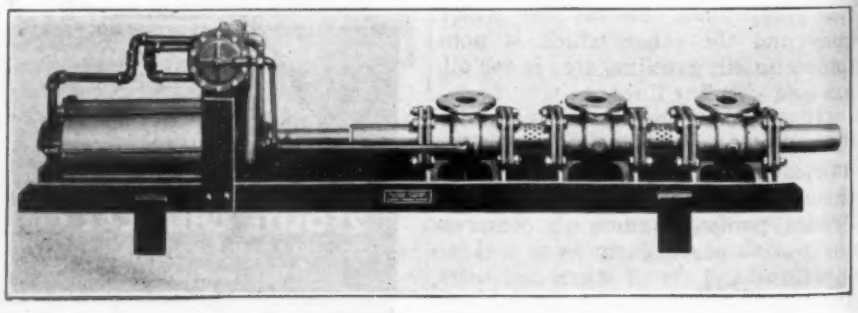
If interested in securing literature or a sample of "Bestolife" Lead-Seal Compound address your inquiry to I. H. Grancell, 1601 East Nadeau St., Los Angeles.

Sure-Shift Interconnector

According to an announcement in a folder issued by the Industrial Interconnector Co. of Buffalo, the Sure-Shift Interconnector makes standby water supply immediately available without the possibility of contamination. The Sure-Shift Interconnector is a hydraulic valving mechanism designed to deliver water from either of two inlets to a common outlet. The choice of inlets is automatically made according to the hydrostatic pressure prevailing in the inlet customarily used.

A pressure drop causes the tube to move within the mechanism allowing water from the other source to pass through the perforations in the tube. According to the announcement, protection against contamination of cross connections is provided at every point. The three valve bodies are separated so that, if the packing in any one should leak, the water would be vented to the atmosphere and would drop into the drainage chamber. Other protections are provided against possible contamination. The illustration shows the Interconnector with the slide tube in the half-way position between one source of supply and the other, thus exposing the holes through which the water enters and leaves the slide tube.

According to the folder, this mechanism has been installed and tested at Niagara Falls, N. Y., for two years and has now been inspected and approved by the N. Y. State Dept. of Health as meeting the Sanitary Code of the N. Y. Public Health Council. The folder describing this new equipment may be obtained from the Industrial Interconnector Co., Inc., 2150 Niagara St., Buffalo 7, N. Y.



Sure-Shift Interconnector

Heat Resistant Paint

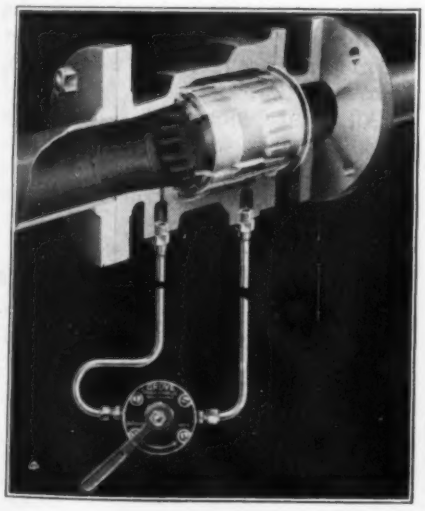
"Butler Locomotive Black" is a recently developed product of the McDougal-Butler Co. of Buffalo. This paint is intended for areas requiring high heat resistance. Its unique feature being that it does not blister or scale from the surface under intense heat, but its wear is evidenced by a slow erosion or chalking. Because of this an excellent surface is left for repainting without the necessity of scraping or cleaning.

Another of this company's products, successful in general application, is "Hardcote," a synthetic enamel having exceptionally quick drying properties and resistance factors beyond the usual finishes, and is intended for maintenance work where unusual acid or alkali conditions prevail. As such it should find application in the water and sewage field.

All of these products are available under priorities. Not available for the present is the special rubber base paint developed with reference to applications in sewage plants. Further information on these protective coatings may be obtained from the McDougal-Butler Co., Inc., Buffalo, N. Y.

Pneumatic Remote Control Valve

The Grove Flexflo Remote Control Valve represents a new departure from the conventional type of valves



in design, construction, and operation. Identified as an "expansible tube type," this valve operates by manual or automatic remote control on the hydraulic principle of balanced and unbalanced fluid line pressure. Virtually no external force is required; therefore a large valve

"The Engineer you wrote for is here, Sir..."

...— Welcome words, our friends in the Sewage and Water Works plants tell us.

☆ ☆ ☆ ☆

...— Because Tennessee Corporation's Consultant Staff, Engineers of long and practical experience, have solved many water and sewage coagulation difficulties.

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...— It is a free service, this consultant service. An investment which the Tennessee Corporation has made in the interest of a healthier America.

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...— Take advantage of this service now! Write us your coagulation problems. It will be a pleasure to help you in the solving of them.

The Mark of Quality

TC TENNESSEE CORPORATION

Tennessee Corporation

ATLANTA, GEORGIA LOCKLAND, OHIO

Manufacturers of

Ferri-Floc *Copper Sulphate*

ANTHRAFILT

A Filter Medium For All Purposes

ANTHRACITE EQUIPMENT CORP.

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H. G. Turner Research Engineer

STATE COLLEGE, PA.

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DIAPHRAGM PUMPS

Hand Sizes 2", 2½", 3", 4"

Power Sizes 3" and 4"

Open Discharge or Force Pump

Edson Special Suction Hose

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Main Office and Works: 49 D St. South Boston, Mass.

New York: 142 Ashland Pl., Brooklyn

84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

Warren Pipe Company of Mass., Inc.

75 Federal St., Boston

Send Us Your Orders Now!

Although a large part of our facilities is being used to produce war materials for our armed forces, we are able to manufacture a complete line of Water Works Products. We suggest that you make a seasonal check-up of your Water Works requirements and let us have your orders now. We want to be in a position to fill your needs with *enough* and on *time*.

The Water Works Convention is always a matter of pleasant anticipation to us. We look forward to seeing old friends, renewing acquaintances and talking over mutual interests in an atmosphere of good fellowship. Meet us in Milwaukee in June. We'll be happy to see you.

BACK THE ATTACK—BUY MORE WAR BONDS

OUR SEVENTY-FIFTH ANNIVERSARY

HAYS MANUFACTURING CO. • ERIE • PA.

WATER WORKS PRODUCTS

HAYS

(SINCE 1869)

★ Invest in Bonds today to provide for extensions tomorrow ★ ★ ★

may be opened or closed as easily as a small one.

Designed for cold fluid service, these new valves are especially suited for handling water, salt water, chemical solutions, oil, gases, and air. They utilize but one non-metallic operating part, are extremely resistant to corrosion, erosion, as well as electrolytic action, and are automatically self-compensating for wear. The capacity is claimed to be greater than that of a globe type valve on the same pressure drop or loss.

The Flexflo valve employs no seats, discs, springs, or weights, and has no packing lamp, stuffing box, or exposed members. It requires no more headroom than a pipe, and eliminates overhead chains, extensions and motorized equipment. Several of the valves may be controlled from a central remote control station, and this control may be hydraulic, pneumatic, manual, electro-solenoid, mechanical or automatic remote control.

Full details in bulletin form are available on request for Bulletin No. 800 to the Grove Regulator Co., 6581 Green St., Oakland 8, Calif.

Carborundum Moves Porous Media to Perth Amboy

With Frank Roe in Charge

Announcement has been made by the Carborundum Co. of Niagara Falls that the Porous Products and Laboratory Ware Dept., under the management of Frank C. Roe, has been moved to the Refractory Division in Perth Amboy, N. J. Mr. Roe will work in development and sales engineering in connection with other refractory products in addition to porous media.

All future inquiries in connection with diffusers for aeration and porous underdrain plates for filters should be directed to the Perth Amboy office.

PEMCO Personnel Changes

The following changes on the executive staff of the Pittsburgh Equitable Meter Co. have been announced:

N. J. Kenny

GOOD DESIGN IS BUILT INTO

"Varec" Approved EQUIPMENT

"VAREC" approved Sewage Gas Control and Safety Devices are an integral part of the modern sewage treatment plant in handling toxic and combustible gases, safely and economically. Sanitation Engineers are welcome to the counsel and cooperation of the "VAREC" Laboratories and Engineering Departments.

The "VAREC" approved Products illustrated above are (A) Fig. 58C—Pressure Relief and Vacuum Breaker Valve with Flame Arrester. (B) Fig. 237—Weste Gas Burner. (C) Fig. 187—Pressure Reducing Regulator. (D) Fig. 450—Flame Trap. (E) Fig. 216A—Manometers. (F) Fig. 48—Sampling Hatch. (G) Fig. 440—Pressure Relief and Flame Trap Assembly.

The Vapor Recovery Systems Company

2820 N. Alemeda St., Compton, Calif.

Branch Offices

New York City; Houston, Texas; New Orleans, La.; Tulsa, Okla. — Agencies Everywhere

N. J. Kenny, formerly General Manager of the National Meter Division in Brooklyn, has been transferred to the home offices in Pittsburgh where he will serve as Assistant to Colonel Rockwell. Mr. Kenny has also been appointed Chairman

A. R. Whittaker

of fthe PEMCO's Post-War Products Development Committee.

A. R. Whittaker, formerly Factory Manager of the National Meter Division, will assume the duties of General Manager and has been placed in complete charge of all functions at the Brooklyn factory.

Spurney Joins Luther and Wood

Mr. F. E. Spurney has recently joined the staff of Luther and Wood, Engineers, of Washington, D. C. Mr. Spurney received his C. E. degree from Cornell Univ. in 1923. He spent 15 years with Turner Construction Co., New York, on building construction work in the Eastern part of the country, serving latterly as superintendent of construction and executive assistant to the vice-president. He spent five years with the Board of Governors of the Federal Reserve System as buildings engineer. He is a member of the American Soc. of Civil Engineers and an Associate Member of the American Soc. of Heating and Ventilating Engineers.

Penn Salt Expands Research and Development Staff

Pennsylvania Salt Co. has announced the following additions to its Research and Development Department Staff:

Dr. R. D. Evans, formerly with New Jersey Zinc Company; Mr. E. A. Bruce of Blaw-Knox Company; Mr. F. W. Jakob, recently discharged from the U. S. Army as 1st lieutenant and graduate of Pennsylvania Military College; Mr. J. L. Stubly of National Association of Dyers and Cleaners; Mr. J. M. Swales of U. S. Navy Inspection Department; Mr.

· 1879 ·

ROSS AUTOMATIC VALVES

ALTITUDE VALVES • SURGE • RELIEF • BACK PRESSURE VALVES • FLOAT VALVES • REDUCING AND REGULATING VALVES

ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.

COMBINATION VALVE
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.

REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

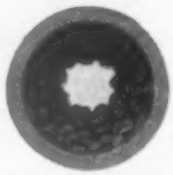
ROSS VALVE MFG. CO.
INCORPORATED
P. O. BOX 595, TROY, N. Y.

★ THE NATIONAL METHOD • OVER 35 YEARS EXPERIENCE ★

SAVE For VICTORY

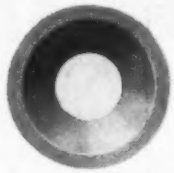
★ ★ ★

EVERYWHERE Americans are being asked to "SAVE FOR VICTORY." Water works superintendents, engineers and public officials can do more in this connection by investigating the National Method of water main cleaning. This method restores the carrying capacity of pipe to at least 95 per cent of that of new mains, thereby eliminating the necessity for purchase of new mains. Aside from this the National Method makes possible lower pumping costs, greater delivery, reduced insurance rates and clean water.



Before Cleaning

The NATIONAL METHOD



After Cleaning

GUARANTEED TO RESTORE 95% ORIGINAL CAPACITY

The National Water Main Cleaning Co.
30 Church St. Branches: New York 7

115 Peterboro St., Boston 15, Mass.
1221 Mortgage-Guarantee Bldg., Atlanta 3, Ga.
7103 Dale Ave., St. Louis 17, Mo.
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3812 Castellar St., Omaha 5, Neb.
P. O. Box 683, Jacksonville 1, Fla.
205 West Wacker Dr., Chicago 6, Ill.
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THE *Bailey Synchro-Meter* GIVES YOU *Flexibility* IN METERING APPLICATIONS

● This meter panel includes both direct mechanically operated Fluid Meters and Bailey Synchro-Meters, which are electrically operated by remote transmitters.

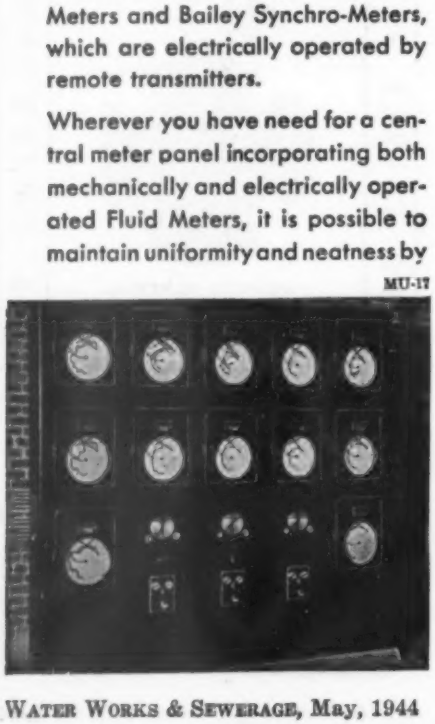
Wherever you have need for a central meter panel incorporating both mechanically and electrically operated Fluid Meters, it is possible to maintain uniformity and neatness by employing this system of transmitting meter and recorder readings.

Readings of flow, pressure, temperature, liquid level and other factors are accurately and quickly transmitted from out-of-the-way places to the receiving indicator, recorder or integrator by the Bailey Synchro-Meter.

This electrical mechanism which is completely described and illustrated in Bulletin No. 194-A, can also be used to eliminate the necessity of running high pressure piping up to meter and control panels.

Write for your copy of this new Bulletin.

MU-17



BAILEY METER • COMPANY •
1072 Ivanhoe Road, Cleveland, Ohio
BAILEY METER COMPANY LTD., MONTREAL

J. J. McBride of Franklin Research Company; Miss Katherine Dilworth of Delaware County Hospital; and Miss Gertrude Schutze of National Broadcasting Corporation.

New staff members also include Miss Margaretta E. Aeugle of Duke University and Miss Gladys Molyneux of Cornell University.

Mr. Thomas Toovey, well known pulp and paper specialist, has been transferred from Sales Service to the Research and Development Department where he will have supervision of research and development work related to new and improved pulp and paper chemicals.

Hanlon-Waters Acquired by Climax

Hanlon-Waters, a leading manufacturer of control instruments, has been acquired by interests owning Climax Engineering Co. and McAlear Manufacturing Co. and in the future will be operated as a division of Climax Engineering, under continuing Hanlon-Waters management.

The McAlear Co. of Chicago, is the maker of control devices used principally for industrial and heating service. The two companies will be operated as separate divisions, but using the full plant facilities of each.

The Hanlon-Waters line includes, in addition to automatic control instruments, bolted and welded steel tanks and separators. The company holds large Government contracts for portable military pipe lines, which the company's engineers helped to develop.

Climax Engineering of Clinton, Iowa, third member of the group, manufactures gas Diesel engines, electric generating sets, etc., widely used in the oil and power fields before their more recent entry into the water and sewage works field.

Two Bridgeport Brass Managers Elevated to Officialdom

At the annual meeting of the stockholders of Bridgeport Brass Co. of Bridgeport, Conn., two executives were made officials of the Company. Mead W. Batchelor, Works Mgr. of the Mill Division, was named a vice president, and A. Dean Merwin, Sales Mgr. of the Fabricating Division, was made Asst. Secy.

Mr. Batchelor joined the Company in 1933 and has been Mgr. of the Mill Division since 1942. Mr. Merwin's service dates from 1900 and he has been Sales Mgr. of the Fabricating Division since 1924.

New District Managers for H. K. Porter Co.

Appointments of district managers in Rochester, N. Y., Cincinnati, O., and Philadelphia, Pa., and of a service engineer for northern New Jersey, have been announced by H. K. Porter Co., of Pittsburgh, Pa., manufacturers of process equipment, pumps, locomotives and freight cars.

Joseph F. Gaffney is in charge of the new Porter service and engineering office in Alliance Bank Bldg., Rochester, N. Y., serving northern New York.

R. W. Steves heads a similar office in Carew Tower, Cincinnati, O., for major portions of Ohio, Kentucky, West Virginia and Indiana.

W. T. Campbell, Philadelphia engineer, has been appointed manager for the district office in Girard Trust Bldg., Philadelphia, Pa., covering western New Jersey, eastern Pennsylvania and Delaware.

J. L. Cunningham, of Union, N. J., has been appointed field service engineer for northern New Jersey for the Chemical Process and Quimby Pump Divisions of Porter.

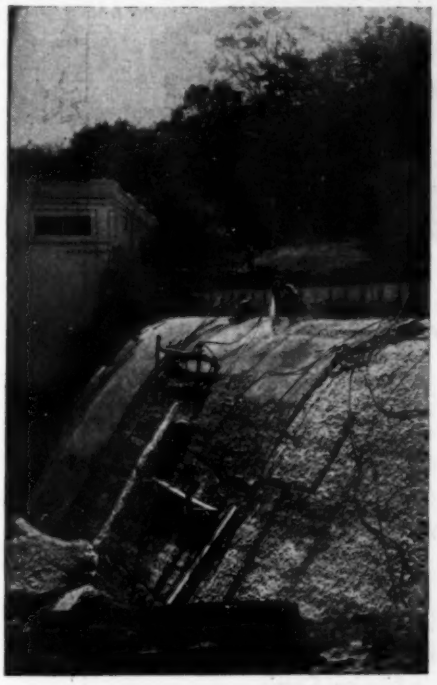
Army-Navy "E" Awards

Among the manufacturers recently receiving the Army-Navy "E" production award have been the Cooper-Bessemer Corp. of Mount Vernon, Ohio, which had hitherto held awards from the Maritime Commission; the Cochrane Corp. of Philadelphia, Pa.; and additional awards to the Worthington Pump & Machinery Corp. Second and third star renewals of the "E" production awards to two plants of the Worthington Pump & Machinery Corp. constituted the twelfth and thirteenth honors accorded men and women and management of Worthington plants.

Other manufacturing plants also receiving the award include the San Francisco plant of the Link-Belt Co. (Pacific Division); the Worthington-Gamon Meter Co. at Newark, N. J.; the General Chemical Co.'s Newell Works, Newell, Pa., and the General Chemical Defense Corp. at Pt. Pleasant, W. Va.

The Cooper-Bessemer citation read "for outstanding production of engines," and the Army-Navy "E" now flies the triple starred "M" pennant denoting the several citations and awards by the Maritime Commission for marine engine production. We had the privilege recently of going through the Cooper-Bessemer plant and seeing the precision casting, machining and finishing of C-B engines, many of which have been going across the ocean to our allies.

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



A DAM SAVED WITH "GUNITE"

The photograph to the left shows various stages of the work of reintegrating with "GUNITE" the downstream face of a badly eroded concrete dam of the Central Hudson Gas and Electric Company, in central New York, near Poughkeepsie. Note cleaned and chipped portion, in the foreground, shooting the "GUNITE" at top middle and a finished section on the left. Drainage channels were provided behind the "GUNITE" to take care of seepage. This work was done by us in 1942.

Our Bulletin Number 2200 describes similar jobs and many other uses of "GUNITE." Write today for a copy.

MANUFACTURERS OF THE "CEMENT GUN"

DOW
FERRIC CHLORIDE
35-47% SOLUTION
Shipped in Tank Cars
60% CRYSTALS
Packed in 300 or 500 lb. Barrels

★ SLUDGE CONDITIONING
★ SEWAGE COAGULATION
★ WATER PURIFICATION

THE DOW CHEMICAL COMPANY
MIDLAND MICHIGAN

PIPE ACCORDING TO THE A.S.A. LAW OF DESIGN

Mono-Cast Centrifugal Pipe can be manufactured in specific weights for specific laying conditions, and in accordance with the recently adopted A.S.A. Law of Design. You get the **exact** pipe your conditions call for.

PROMPT DELIVERIES with suitable priorities.

AMERICAN CAST IRON PIPE COMPANY
BIRMINGHAM 2, ALABAMA
Sales Offices in Principal Cities

Fairbanks, Morse Doubled Profit Sharing Fund from 1943 Earnings

Officials of Fairbanks, Morse & Co. have announced that better than three quarters of a million dollars has been set aside out of 1943 profits to be distributed to eligible employees, under the Company's profit-sharing plan which has been in vogue for a number of years. This doubling of the previous year's fund was possible in spite of the increase in the number of employees eligible to participate. Also from profits in 1943 deposits were made in a special reserve to provide for losses and unusual expense anticipated as a result of the war.

Allis-Chalmers '43 Sales Reached All-Time High

The 1943 sales and earnings of the Allis-Chalmers Co. of Milwaukee reached an all-time high. This peak of production in the nine plants of the company was the result of devoting "100 per cent of the company's resources to the winning of the war." The order backlog at the end of 1943 totalled more than the total sales for the year. Renegotiation of contracts for 1942 were completed without liability to the Company.

FOR THE *Duration*

COPPERSETTERS aren't available but they are worthy of including in your plans of what you'll do when you can do things RIGHT.

Learn more about the COPPERSETTER and its many advantages for water meter settings.

FORD Meter Box Co.
WABASH, INDIANA

MUELLER COLUMBIAN

IF YOU WANT THE FINEST FIRE HYDRANT MADE—ONE THAT HAS ALL THE DESIRED FEATURES—ONE THAT PERFORMS DEPENDABLY YEAR AFTER YEAR WITH A MINIMUM OF UPKEEP . . . GET MUELLER COLUMBIAN IMPROVED FIRE HYDRANTS

MUELLER CO.
CHATTANOOGA, TENN.

ODOR and TASTE are health factors too...

The WATER SUPPLY that pleases nose and palate is an important contribution to community health — people drink more of it.

ESOTOO* is the answer to a simple, sure, and more economical method of controlling residual chlorine — especially in "break-point" chlorination.

ESOTOO* is the Ideal De-Chlorinator.

*ESOTOO is "Virginia's" Trade Name for Liquid Sulfur Dioxide.

VIRGINIA SMELTING COMPANY
WEST NORFOLK, VIRGINIA

HYDRO-TITE

HYDRO-TITE — The self-caulking joint compound that makes cast iron water pipe joints — strong — tight — flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

FIBREX — The sanitary paper packing that is used like braided jute. Free from bacteria — treated with a water repellent — put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St.
New York, N. Y.

DRY BRAIDED
Fibrex

HEAVY-DUTY INCINERATION
MORSE BOULGER
DESTRUCTORS

FOR THE

INCINERATION OF MUNICIPAL WASTES

GARBAGE, RUBBISH,
SEWAGE SCREENINGS
AND SLUDGE

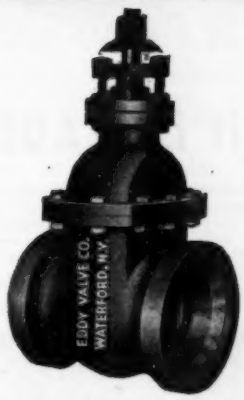
FOR COMPLETE INFORMATION
CALL OR WRITE

MORSE BOULGER DESTRUCTOR CO.

HOME OFFICE:
205-W East 42nd St., New York 17, N. Y.

EDDY

FIRE HYDRANTS
AND VALVES
WATER WORKS EQUIPMENT



EDDY VALVES
For
Water Works
and
Sewage Disposal
Plants

EDDY FIRE HYDRANTS
For Fire Protection Service

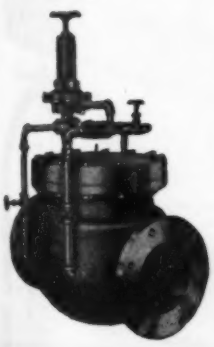
Write for Complete Catalog

Eddy
VALVE COMPANY
WATERFORD, N. Y.

Water Pressure Relief Valve

On excess pressure, due to line surges or excess pumping head, this valve automatically opens to dissipate necessary water volume to maintain desired line pressure. The valve is arranged either with atmospheric pilot valve exhaust or self-contained, according to service conditions and requirements.

Valves may be arranged to open at abnormal pressures and held open under subnormal pressures until the surge subsides, and then close when normal conditions prevail.



Sizes:
3" to 36"

Angle and Globe Patterns.

Write for Specifications.

GOLDEN-ANDERSON VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

INQUIRIES INVITED

on all Problems of

WATER TREATMENT

Whether your problem of water rectification is large or small, we have a form of equipment to serve your needs. We manufacture and install equipment for Gravity Filtration and Softening Plants; Pressure Filters and Zeolite Softeners; Swimming Pool Recirculating Appliances; and Water Treatment Units of all types.

ROBERTS
FILTER MFG. CO.
607 COLUMBIA AVE.
DARBY, PA.

LEADITE

The Pioneer Self-Caulking Material for C.I. Pipe

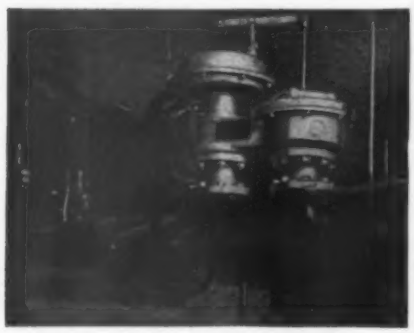
Be positive

it is LEADITE

More miles of C. I. bell and spigot water pipe have been jointed with *Leadite* than any other melted, self-caulking material . . . Also, Leadite has seen more years of service.

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2

No Caulking



P. F. T. Flame Traps protect the sewage treatment plants of over 235 war projects

In camps and armament plants throughout the nation, the fire and explosion hazards created by sewage gas at the disposal plants are eliminated by P.F.T. Flame Traps, P.F.T. Boiler Room Equipment is preferred.

Write for Bulletin No. 121-A describing P.F.T. Flame Traps, Pressure Relief Valves, Waste Gas Burners, Condensate Drip Traps, Pressure Gages and other boiler room accessories which assure sage operation of digested sewage sludge treatment plants.

P.F.T. **PACIFIC FLUSH-TANK COMPANY**
4241 Ravenswood Ave., Chicago, Ill.
New York Charlotte, N. C.

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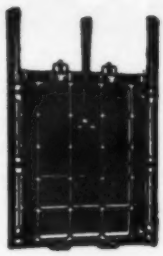

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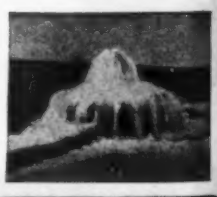

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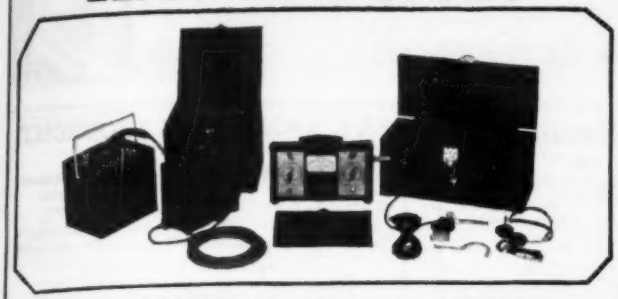

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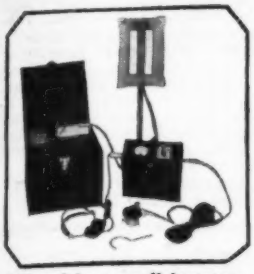

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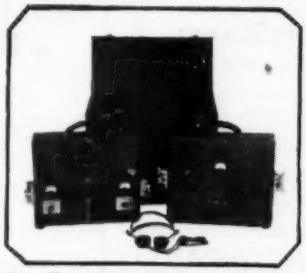

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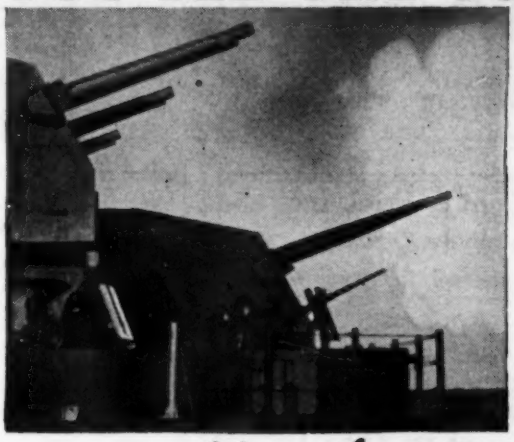

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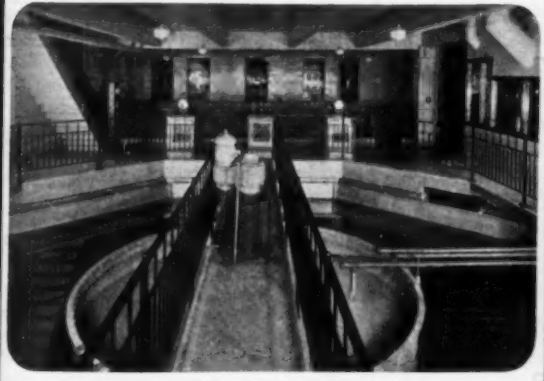

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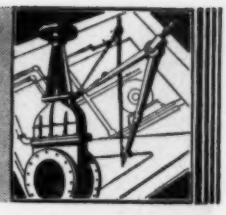

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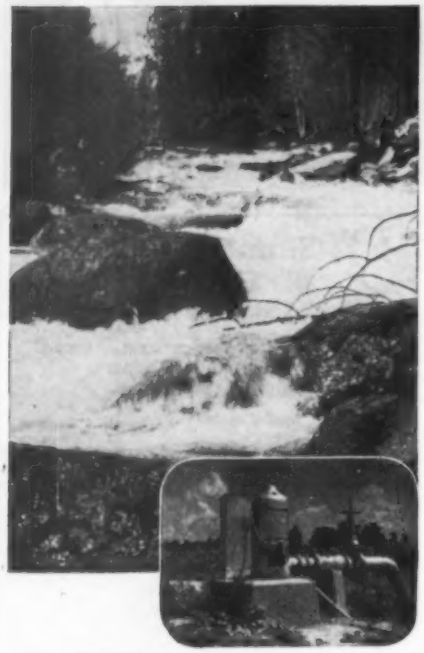

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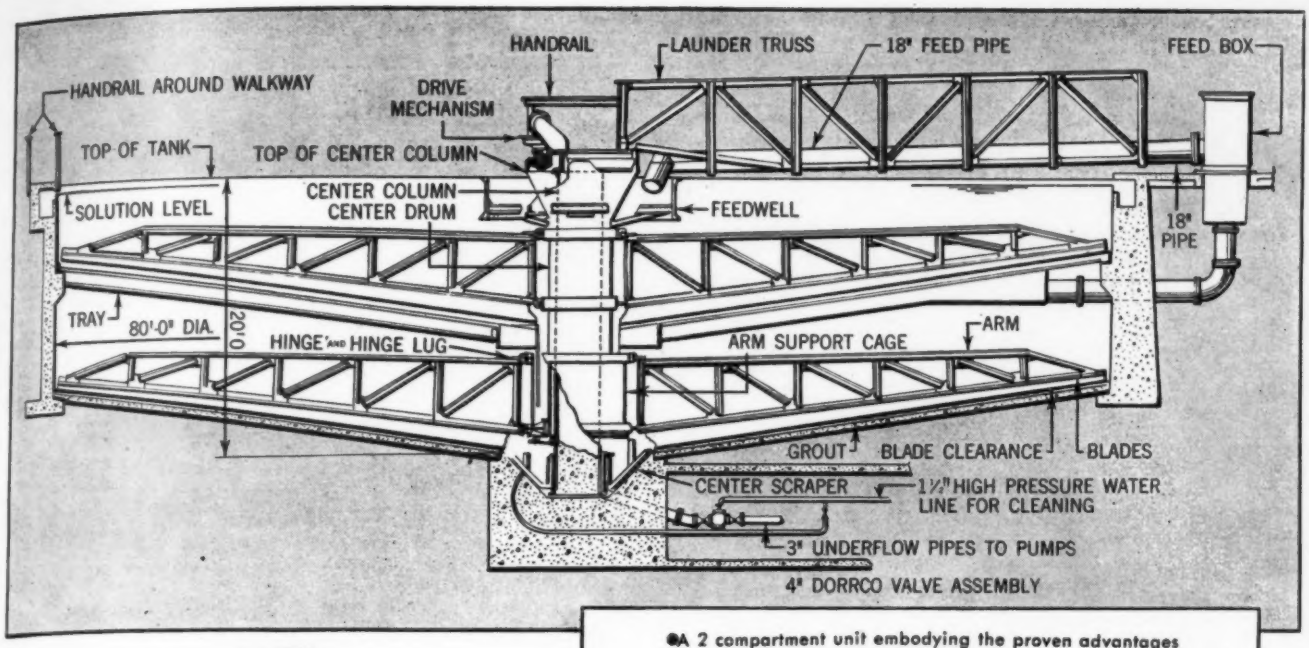

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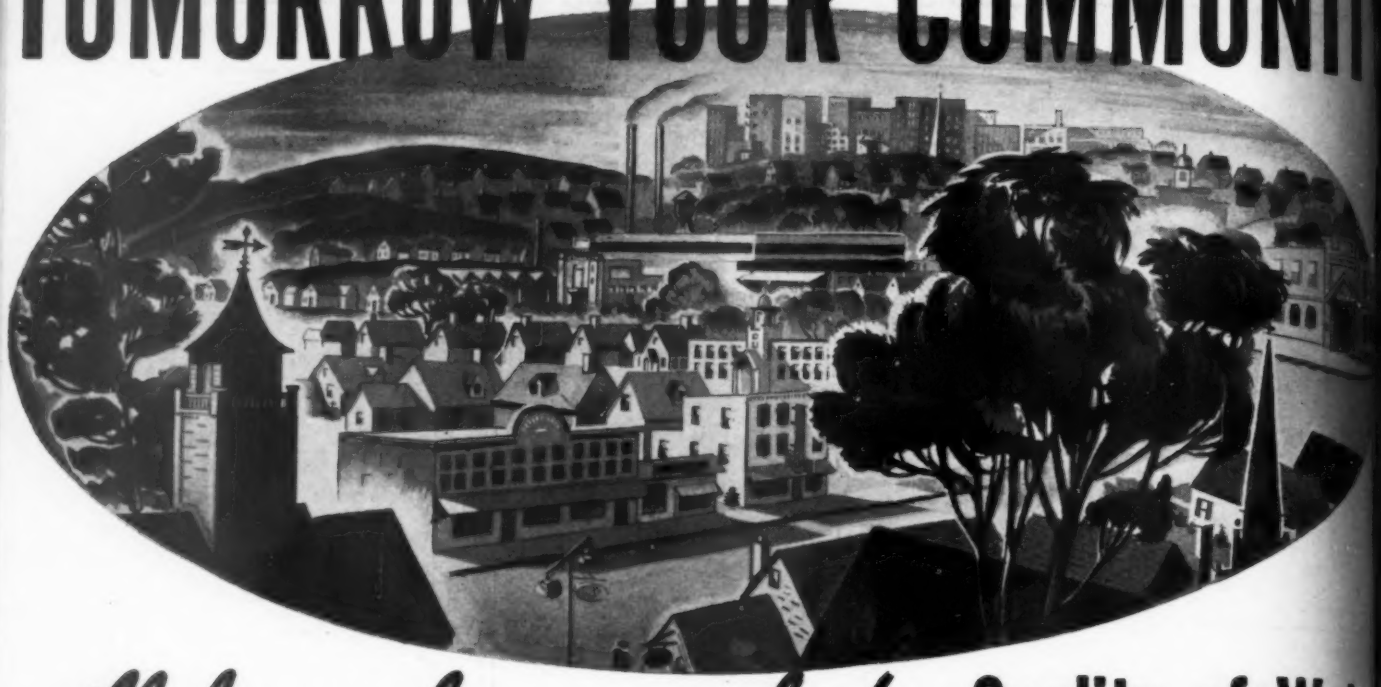
ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

TOMORROW YOUR COMMUNIT



will demand an even higher Quality of Wate

In bacteriological and chemical content, and in "aesthetic" characteristics, American communities are demanding an increasingly higher quality of water. So in blueprinting for tomorrow you will want to consider these Safety-Plus factors:

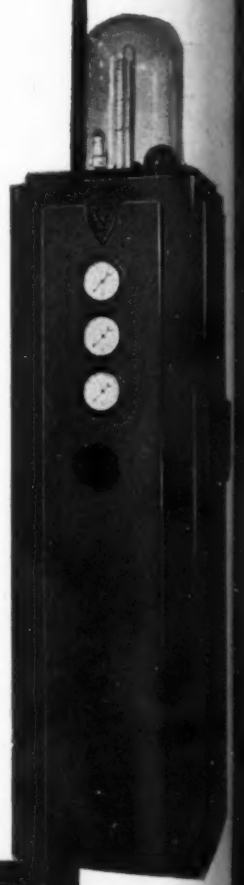
1 Break-Point Chlorination for maximum protection, and to control taste and odor —

2 Fully Automatic Control of application to make possible a definite chlorine residual throughout every foot of your distribution system —

3 Duplicate Units to provide a peak load reserve and be ready to serve in any emergency.

Now is the time to secure from your W&T Representative the essential technical data you will need in planning for Safety-Plus for tomorrow.

"The Only Safe Water is a Sterilized Water"



ARMY E NAVY

Blueprint Now!